EPIDEMIOLOGY OF THE DISEASES OF NAVAL IMPORTANCE IN KOREA

Prepared by

TSAI-YU HSIAO

Entomologist, Preventive Medicine Division

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NAVY DEPARTMENT
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FOREWORD

The purpose of this manual is to summarize the available medical, parasitological, and entomological literature on Korea and to present a condensed picture of the prevalence, distribution, and transmission of the infectious diseases of military importance, together with information on the distribution, habits, and identification of the vectors and reservoir hosts. Emphasis has been placed on the epidemiology of those diseases which present a control problem different from that experienced elsewhere and which involves large numbers of naval personnel, such as the arthropod-borne diseases and acute infectious diseases.

The principal sources of information have been the Journal of the Chosen Medical Association, Mitteilungen aus der Medizinischen Hochschule zu Keijo, Japan Medical World, Journal of the Chosen Natural History Society, Acta Medicinalia in Keijo, Journal of the Public Health Association of Japan, Insecta Matsumurana, Kyoto, Gunidan Zassi (Official Publication of the Imperial Japanese Army Medical Corps), Kaigun Iji Hōkoku Saigō (Medical report by the Medical Bureau of the Navy Department of Japan), Journal of Oriental Medicine, Tenthredo, Keizyō Journal of Medicine, Annotationes Zoologicae Japonenses and Oyo-Dobutsugaku-Zasshi. The statistical information has been derived principally from the official reports in Nippon Teikoku Tokei Nenkan (Statistical yearbook of the Japanese Empire), Chōsēn Sōtokufu Shisei Nempo (Annual report of the administration of the Government-General of Korea), Tokumu Tokei (Statistics of overseas affairs), and Chosen Nenkan (Chosen yearbook). Classified intelligence reports have also been an important source. The bibliography contains a list of the principal references used in compiling the manual.

Korean romanization is used for all the place names appearing in the manual and the Gazetteer to Maps of Korea prepared by the Army Map Service, War Department, 1944, has been followed in this respect. The Japanese romanization of the place names is given in a list in the appendices.

Acknowledgement is due to Capt. Van C. Tipton (MC), U.S.N.; Comdr. J. D. DeCoursey H(S), U.S.N.R.; and Lt. Comdr. Byron D. Casteel (MC), U.S.N., who have examined the manual and made valuable suggestions.

Tsai-Yu Hsiao,
Entomologist,
Preventive Medicine Division,
Bureau of Medicine and Surgery.

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INTRODUCTION

Geography.--Korea, consisting of a peninsula and several large and hundreds of small islands, extends from latitude 34° 18' to 43° N. and from longitude 124° to 130° 47' E. The peninsula stretches southward from Manchuria with an estimated length of approximately 600 miles and an extreme breadth of 135 miles. It has a total area of 86,000 square miles and a coastline of 1,740 miles. To the north the Yalu and Tumen Rivers form the natural boundary with Manchuria. To the northeast, for 11 miles along the Tumen River, Korea adjoins the Maritime Province of the U.S.S.R. Vladivostok is about 80 miles from the Korean border. To the east it is bordered by the Sea of Japan, to the south by the Korean Strait and to the west by the Yellow Sea. About 50 miles off the southwest corner of the peninsula lies the large island of Cheju (Quelpart) and about 35 miles off the southeast corner of the peninsula is the island of Tsushima, the latter being under the jurisdiction of Nagasaki Prefecture of Japan. Ullung-Do (Dagelet) is about 80 miles off the east coast.

Korea has many good harbors on the south and west coasts, such as Pusan, Mokp'o, Inch'ŏn, Yŏsu and Chinnamp'o. The tides rise much higher on the west coast than on the east coast.

The country as a whole is mountainous. It is quite steep on the east side and gradually slopes down on the western side. Northern Korea is more mountainous and rich in timber and minerals, whereas southern Korea is comparatively level and well cultivated. Principal rivers are the Amnok-Kang (Yalu), Tumen-Gang (Tumen), Taedong-Gang, Han-Gang, and Nakton-Gang.

Climatology.--The climate of Korea is continental, running to extremes of both heat and cold. As a whole the climate is milder in the south and east than in the north and west. The coldest month of the year is January and the hottest

August. The minimum monthly mean temperature in January is 6° F. in Unggi and the maximum monthly mean in August is 90° in Pusan along the southern coast. The annual average temperature is 42° in Unggi, 46° in Sŏngjin, 50° in Chinnamp'o and 56° in Pusan.

Rainfall is abundant compared with that of Manchuria but not as abundant as in South China and Japan. The average annual rainfall is from 26 inches in the north to 57 inches in the south. The rainy season begins in June and ends in September and the highest precipitation occurs in July and August.

Population.--According to the report of the Ministry of Overseas Affairs of the Japanese Government, Korea's population was 24,326,327 at the end of 1940. About 96.5 per cent of the total population are Koreans, 3 per cent Japanese and 0.5 per cent foreigners, mostly Chinese. About 75 per cent of the Koreans were farmers, 38 per cent of the Japanese were engaged in public service and 39 per cent in commerce and industry. The average density of the population was 285 persons per square mile in 1940. The population according to Provinces at the end of 1939 is shown in table 1.

TABLE 1. POPULATION BY PROVINCES, 1939

Province	Population	Square miles
Kyŏnggi-do	2,590,002	4,949
Ch'ungch'ŏng-pukto .	900,111	2,863
Ch'ungch'ŏng-namdo .	1,525,379	3,129
Chŏlla-pukto	1,543,426	3,310
Chŏlla-namdo	2,491,213	5,360
Kyŏngsang-pukto . . .	2,431,675	4,749
Kyŏngsang-namdo . .	2,209,135	7,329
Hwanghae-do	1,721,527	6,463
P'yŏngan-pukto	1,538,197	10,978
P'yŏngan-namdo . . .	1,655,738	5,766
Kangwŏn-do	1,591,918	10,137
Hamgyŏng-pukto . . .	934,795	7,854
Hamgyŏng-namdo . .	1,667,531	12,344

Public Health Administration.-- During the Japanese protectorate the central public health administration in Korea was executed by the Health Section of the Police Bureau. Each Province maintained a provincial health section under the control of the police division of the provincial government. Local health work was carried out by local police physicians

or public physicians, the latter being subsidized for their part-time official service by the Government. All physicians were required to report cases of communicable diseases to the police authorities. Quarantine stations were established at large cities, such as Chinnamp'o, Ch'ŏngjin, Inch'ŏn, Kunsan, Mokp'o, Najin, Pusan, Sinŭiju, Sŏngjin, Unggi, Wŏnsan, and Yongamp'o.

Medical Facilities.-The Domei Jiji Nenkan (Domei current event yearbook), 1943, covering the year 1940, listed 161 hospitals, 7,237 doctors (3,633 physicians and 3,604 practitioners with limited license), 913 dentists, 2,037 midwives, and 2,098 nurses. There was one physician per 7,600 persons as compared with 1 per 1,050 persons in Japan. The hospitals in Korea include the following types: Government, public, private, Red Cross, army, railway, and mission. The number of beds varies from 10 to several hundred according to type of hospital. In 1939, out of 148 hospitals, 4 were Government, 51 were public, and 93 were private. It is reported that there was one provincial hospital established in every provincial capital. However, provincial hospitals were not limited to provincial capitals only. Municipal hospitals were found in all towns of 10,000 population or over. An intelligence report stated that at least 21 mission hospitals were in operation in Korea on 7 December 1941. In addition to the general hospitals, there was a Government leprosarium at Sorok-Do, a mission leprosarium at Pusan and another one at Yŏsu.

Doctors in Korea were classified into various groups. The highest or superior group included doctors who were permitted to practice anywhere in the Japanese empire; the second highest group included doctors who were allowed to practice anywhere in Korea; the third group included doctors who were restricted to practicing only in a Province; and a still lower classification was held by doctors who were permitted to practice only in a town or local district.

According to the official statistics (Anon., 1940), in 1938 there were 5 medical schools, 3 in Seoul, 1 in P'yŏngyang, and 1 in Taegu; 1 dental school in Seoul; and 1 pharmacy school in Seoul. There was a serum manufacturing institute in Seoul under the direct administration of the Government-General.

Chapter I. ENTERIC DISEASES

1. DYSENTERY, ENTERITIS AND DIARRHOEA

Dysentery is very prevalent in Korea and causes a death rate of 38 per 100,000 Japanese population in the country (Sai, 1936), and a morbidity rate of from 177 to 311 per 100,000 Japanese (Takida, 1932). From 1932 to 1939 an average of 3,415 cases with 663.5 deaths occurred annually in the whole territory (Takahashi, 1941). In 1940 (Anon., 1943) 4,168 cases with 754 deaths were reported. In case incidence, dysentery ranks second to typhoid fever but its fatality rate is much higher. Table 2 shows the number of cases and deaths in the whole country from 1931 to 1940 (Anon., 1920-40, 1937, 1943).

The disease occurs throughout the year but is most prevalent from June to October. Ochiai (1940) showed that 87.4 per cent of the dysentery deaths from 1933 to 1937 occurred in these 5 months. Younger people are more susceptible to the disease. Takida (1932) showed that 48.3 per cent of the dysentery cases and 61 per cent of the deaths in 1926-30 occurred in the ages below 10 years. Both morbidity and mortality decreased as the age advanced.

Bacillary dysentery prevails every year but the type of bacillus varies with different epidemics. The Shiga-type prevailed in Seoul in 1926. Reports on the types of dysentery bacilli in Korea are mostly based on Shiga's classification. In general, atypical type I seems to be the dominant type of bacillus in Korea. Of the 25 cultures obtained from 36 dysentery cases in the Pediatric Clinic of the Government Hospital in 1927, 12 (48 per cent) belonged to atypical type I, 7 (28 per cent) to atypical type III, and 6 (24 per cent) to the typical type (Shingu, 1927). Ishihara et al. (1932) reported that of 295 cases of dysentery treated in the Ryusan (Yongshan) Railway Hospital from 1928 to 1931, 240 (81.5 per cent) were positive for dysentery bacilli and E. histolytica. Of these, 15.5 per cent belonged to the typical type, 52.0 per cent to the atypical type I, 25.2 per cent to the atypical type III, 1.6 per cent to the Schmitz type, and 5.7 per cent to E. histolytica. From 1919 to 1929, 283 dysentery cases were admitted to Ranan Military Hospital, 234 (82.7 per cent) were found bacillus positive and 49 (17.3 per cent) were negative (Tikano, 1931). Of the 234

positive cases, 111 (47.4 per cent) were Y-type, 74 (31.6 per cent) were Shiga-type, 11.6 per cent were F-type, and the remainder were of unknown type. Takida (1932) showed that in the Korean Army 24 per cent of the bacilli isolated from the dysentery cases belonged to the Shiga type, 41.5 per cent to the Flexner type, 32.9 per cent to Y-type, and 1.5 per cent to non-acidic atypical type. The author examined 3,971 apparently healthy persons and found 72 (1.8 per cent) to be dysentery bacillus carriers.

Amebic dysentery is widespread in Korea although there are no available statistics regarding its actual incidence. Avison (1925) stated that amebic dysentery is more important than bacillary dysentery in Korea. However, in the Japanese Army in Korea there were reported 788 cases of bacillary dysentery against only 20 cases of amebic dysentery from 1926 to 1930. Of 604 dysentery cases reported between 1911 and 1922, 483 (80.0 per cent) were bacillary and 121 (20.0 per cent) amebic.

TABLE 2. DYSENTERY, CASES AND DEATHS, 1931 to 1940

Year	Number cases	Number deaths	Fatality rate (%)
1931	1,912	406	21.23
1932	2,339	561	23.98
1933	2,833	553	19.52
1934	2,695	527	19.55
1935	3,675	749	20.38
1936	4,584	839	18.30
1937	4,329	815	18.83
1938	4,957	810	16.34
1939	3,321	454	13.67
1940	4,168	754	18.09

Endamoeba histolytica is very prevalent. It was estimated that 30 per cent of the Korean people are infected with this parasite (Takida, 1932). Yabe et al. in 1923 reported that 2.5 per cent of 1,652 outpatients in the Taikyu (Taegu) Charity Hospital in 1922 were found to be infected with the ameba (Taniguchi, 1929). Kessel (1925) reported an infection rate of 36 per cent among 80 patients and 73 apparently healthy Koreans, and 27 per cent among 59 foreigners in Seoul on the basis of single examinations. The former percentage rose to 40 per cent and the latter to 33 per cent after 6 examinations. Sai (1926) reported an infection rate of 1.5 per cent among 2,000

Korean outpatients in the same hospital after a single examination and 30 per cent among 334 apparently healthy Koreans after 6 examinations. Chiba (1931) showed 12.5 per cent infection among 200 Korean patients in Keijo Medical College Hospital (average 5.2 examinations) and 47 per cent of 185 Korean soldiers (examined 6 times). Taniguchi (1929) quoted that in 1932 Kuwahara examined 1,356 Japanese and 431 Koreans in Seoul for the parasite, which resulted in an infection rate of 4.6 per cent for the former and 10.4 per cent for the latter (single examinations). Takida (1932) examined 175 Korean soldiers and found 87 (49.7 per cent) positive for E. histolytica.

Amebic abscess of the liver is not uncommon in Korea. Ludlow (1917, 1920) reported 60 cases and 7 deaths, all Koreans, in the Severance Union Medical College, Seoul, from 1912 to 1919, representing a case fatality rate of 11.6 per cent.

Enteritis and diarrhea are common in all parts of the country. These infections are more prevalent during July and September, due to the insanitary conditions and poor eating habits.

2. TYPHOID AND PARATYPHOID FEVER

The typhoid-paratyphoid group of diseases is one of the most important causes of morbidity and mortality in Korea. Typhoid fever ranks first among the infectious diseases as to the number of cases, and second (to smallpox) as to the number of deaths. There are from 6,000 to 7,000 cases annually which represents four-fifths of the total cases of the reportable diseases. From 1932 to 1938 there was an average of 6,453 cases and 985 deaths annually (Takahashi, 1941). The figures given for 1939 were 1,538 cases and 280 deaths which may indicate an incomplete report. The Domei News Agency (Anon., 1943) reported 12,098 cases of typhoid fever with 1,795 deaths in 1940. Typhoid fever is more prevalent in the Seoul District than elsewhere in Korea. An incidence of 700 per 100,000 and a death rate of 135 per 100,000 were reported among the Japanese in Seoul in 1925 (Gate, 1926). Ishihara et al. (1938) stated that the morbidity rate of typhoid fever in Seoul was 2.5 to 6 times as high as that in the cities in Japan. Zen et al. (1937) reported 3,905 cases of typhoid fever in Seoul between 1930 and 1934.

A total of 1,616 cases of typhoid fever with 238 deaths were reported during an epidemic in Seoul in 1928. In this particular year the disease was most prevalent in February and March when 916 cases were recorded (Matsuoka, 1929). An unprecedented epidemic of the disease occurred in this city in 1935 when a total of 1,152 cases were treated in the Municipal Hospital alone (Zen et al., 1937). During this epidemic the majority of the cases occurred between June and November.

The disease occurs throughout the year but is most prevalent in autumn and least prevalent from January to May. Sai (1936) showed that over 54 per cent of the typhoid deaths occurred between August and November Zen et al. (1937) stated that in Seoul the disease was most prevalent in August among the Koreans and in October among the Japanese. Ishihara et al. (1938) reported that 30.5 per cent of their cases occurred in the months of September and October.

The disease is more prevalent among adults than children. Zen et al. (1937) studied 872 cases (468 male and 404 female) during the 1935 epidemic in Seoul and reported that 255 (29.3 per cent) were children under 16 years of age and 617 (70.7 per cent) were adults. About 50 per cent of the cases treated in the Ryusan (Yongshan) Railway Hospital from 1928 to 1934 were 20 to 29 years old (Nagai, 1935). The case fatality of the disease varies with the years, from 14.2 to 23.6 per cent from 1932 to 1938 (Takahashi, 1941). The mortality is about the same for both sexes but is higher for adults than for children. Mortality of 25.3 and 7.4 per cent, respectively, was recorded during the 1935 epidemic (Zen et al., 1937).

Paratyphoid fever was reported under typhoid fever until 1911; since then it has been reported independently. The average annual incidence for this disease was reported to be 508 cases with 35 deaths from 1932 to 1938 (Takahashi, 1941). Takida (1932) reported 2,003 cases of paratyphoid fever with 178 deaths in the whole territory from 1926 to 1930 with a case fatality rate of 11.4 per cent among the Koreans and 8.7 per cent among the Japanese. The seasonal distribution of paratyphoid fever in Korea is similar to that of typhoid fever, i.e., the disease occurs throughout the year but is most prevalent in the autumn and least prevalent in the spring. The case fatality rate of paratyphoid fever was reported to be from 5.4 to 10.0 per cent (Takahashi, 1941).

Paratyphoid A has also been reported from Korea. Two cases of the disease, proved by bacteriological findings, were treated in the Municipal Hospital, Seoul, in the summer of 1938 (Nakanishi, 1939). One of the cases had been in Mukden, and the other had not been outside of Seoul for 1 year previous to the attack of the disease. Takida (1932) reported 50 cases of paratyphoid A in 19 Government hospitals in Korea from 1926 to 1930 and 523 cases of paratyphoid B during the same period.

Carriers of typhoid and paratyphoid bacilli are not uncommon in Korea. Takida (1932) reported that 5.1 per cent of apparently healthy persons were found to be carriers of typhoid bacilli and 2.1 per cent to be carriers of paratyphoid bacilli in 1929. Ishihara et al. (1938) examined 4,684 persons

in Seoul and found 4 to be carriers of typhoid bacilli and 4 to be carriers of paratyphoid bacilli.

Houseflies which are, for a large part, responsible for spreading typhoid fever, are found throughout the year in Korea. Due to the better heating of the houses they often survive the winter in the adult stage. They begin to appear in April, increase in May and June, and taper off through August, after which time they again commence to increase. A large number of flies are still present in October.

3. CHOLERA

Cholera has a long history in Korea. According to Ninomiya et al. (1939) it was epidemic in this country in 1489. In 1524 it occurred in P'yŏngyang with more than 7,600 deaths. In 1786 the disease spread over the entire country and was reported to have caused 370,000 deaths. It was again epidemic in 1821-22, 1881 and 1886. In 1895 it caused more than 60,000 deaths in P'yŏngan-pukto and in 1902 it caused more than 10,000 deaths in the Seoul region. In the succeeding 13 years the disease became quiescent with only a small number of cases and deaths occurring during this period. In 1916 the disease was introduced from Japan with 2,069 cases and 1,251 deaths reported. There was a recrudescence of the disease in 1919 and 1920. A total of 16,991 cases and 11,084 deaths were reported in 1919, and 24,229 cases and 13,570 deaths in 1920 (Takida, 1932). Table 3 shows the geographical distribution of the cases and deaths in the epidemics of 1916, 1919, and 1920.

In 1926 the disease broke out again with P'yŏngan-pukto as the center where 250 cases were reported. It died down afterward with only 70 reported cases from Hamgyŏng-pukto and P'yŏngan-pukto in 1932 and 1 case from Kyŏngsang-namdo in 1937. In 1938 due to the war conditions the disease again became active; 50 cases, 32 deaths, and 16 carriers were reported from 19 August to the end of the year.

A recent intelligence report shows that the disease was epidemic in Pusan in the first part of June 1946 with a total of 108 cases and 36 deaths. In Mokp'o, at the same time, 20 cases with 10 deaths were reported. Case fatality rate of the disease is very high ranging from 56 to 68.2 per cent during the epidemic years.

TABLE 3. GEOGRAPHICAL DISTRIBUTION OF THE CASES AND DEATHS OF CHOLERA IN THE EPIDEMICS OF 1916, 1919 AND 1920.

Province	1916		1919		1020		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Kyŏnggi-do	574	379	235	173	2,636	2,019	3,445	2,571
Ch'ungch'ŏng-pukto	-	-	1	1	33	20	34	21
Ch'ungch'ŏng-namdo	12	6	943	617	765	483	1,720	1,106
Chŏlla-pukto	29	20	1,359	874	473	330	1,861	1,224
Chŏlla-namdo	205	106	668	368	13,667	6,419	14,540	6,893
Kyŏngsang-pukto	131	81	76	37	1,650	1,097	1,857	1,215
Kyŏngsang-namdo	940	564	456	331	3,655	2,373	5,051	3,268
Hwanghae-do	136	71	4,507	3,101	464	286	5,107	3,458
P'yŏngan-pukto	1	-	3,471	2,246	-	-	3,472	2,246
P'yŏngan-namdo	-	-	3,787	2,405	87	57	3,874	3,462
Kangwŏn-do	15	11	65	38	488	314	568	363
Hamgyŏng-pukto	-	-	499	297	23	11	522	308
Hamgyŏng-namdo	26	13	924	596	288	161	1,238	770
Total	2,069	1,251	16,991	11,084	24,229	13,570	43,289	25,905

Chapter II. FILARIASIS AND ELEPHANTIASIS

Filariasis is endemic in the southern Provinces of Korea where the disease is most prevalent in the lower basin of the Kum River. The infection rate for elephantiasis among the Koreans was estimated to be about 2 per cent (In, 1927). Go, in 1930, estimated that about 20,000 persons suffered from elephantiasis in Korea (Bun, 1939). Bun (1939) stated that about 2 to 5 per cent of the population in the endemic area suffered from the disease.

According to In (1927), a filarial worm was first discovered in Korea in a bird by Nikagawa. A human case was first reported by In (1927) who discovered a male worm of Filaria bancrofti embedded in the lymph gland of the inguinal region while performing an autopsy on a male from Puyo County, Ch'ungch'ŏng-namdo, who had died from elephantiasis, However, no parasite was found in the blood.

Oh (1929) reported 24 Korean patients, 21 males and 3 females, with filariasis from the Provinces of Hwanghae-do (Anak), Kangwŏn-do (Yongwol), Ch'ungch'ŏng-namdo (Pongsan, Puyo, Taejŏn), Chŏlla-pukto (Chŏnju, Chŏngŭp, I-ri, Kŏch'ang, Kumje, Kunsan, and Sunch'ang), and Chŏlla-namdo (Namp'yŏng and Kwangju). Microfilariae were discovered in all of the patients and an adult worm was found in one of the cases. The author considered that in 20 of the patients the microfilariae had a thin sheath and appeared in the peripheral blood only during the night, characteristic of W. bancrofti while in the other 4 cases the parasites had no sheath and showed no apparent periodicity in their appearance in the peripheral circulation, characteristic of Acanthocheilonema perstans (Filaria perstans).

Bun (1939, 1939, 1940) made more extensive studies on the endemic elephantiasis in southern Korea, especially in Ch'ungch'ŏng-namdo (Nonsan and Puyo) and Quelpart Island. He reported that about 2 to 5 per cent of the population in Nonsan and Puyo suffered from elephantiasis. Of the 161 cases examined all were farmers whose clinical history was peculiar in that they experienced a sudden attack of high fever and

acute lymphangitis and lymphadenitis inguinalis or axillaris after a visible or invisible wound on the foot or hand while working in the fields during the summer or autumn. When the inflammation subsided the distal part of the leg or arm showed acute phlegmonic symptoms, usually persisting for several days. When such an acute attack is repeated, elephantiasic changes and sclerodermia results. No case of elephantiasic change of the scrotum or mamma was observed.

On Quelpart Island the author reported that the disease was most prevalent along the southeastern coastal area where 5 to 10 per cent of the population were infected. It was less prevalent along other parts of the coast and rather rare in the mountains. The clinical symptoms and history of the patients were quite similar to those observed in Ch'ungch'ŏng-namdo. However, the etiology of elephantiasis in southern Korea is still not clear. On the basis (1) that the swelling mainly occurs on legs and feet, rarely on arms and hands, and never on the genital organs and body, (2) that the cases are comparatively mild but with repeated acute erysipeloid attacks which occur only during the seasons requiring more field work, and (3) that microfilaria was found rarely in the blood of patients, some authors in Korea advocated that the causative agent was a kind of streptococcus rather than a filarial worm. Bun (1940) made an etiological investigation of the disease and discredited the theory that elephantoid fever is caused by the allergic reaction of the dead filaria in the body. His experiment may be summarized as follows:

1. All the elephantiasis patients from southern Korea reported an anamnesis of repeated acute erysipeloid attacks in their infected parts which often commenced when they were working in the field. Examination of the primary skin lesions which appeared on the feet of 6 patients while experiencing such an acute attack revealed Streptococcus haemolyticus in every case.

2. When the streptococcus thus isolated was inoculated intracutaneously in normal healthy persons, the reaction was very mild, but when it was inoculated upon the feet of patients with elephantiasis or persons who were infected with Wuchereria bancrofti, the reaction was very severe, causing symptoms quite similar to those of the acute erysipeloid attack of elephantiasis.

3. When the streptococcus thus isolated and killed by heating was inoculated intracutaneously in persons free from filaria and in albino rabbits, the reaction was mild, but when it was injected in a similar manner, mixed with extract of Dirofilaria immitis, the local skin reaction was very conspicuous.

The author concluded that his experiment shows that some unknown body constituents of filaria make the skin tissue of the host hypersensitive to the streptococcus infection and that elephantiasis in southern Korea is caused by repeated erysipelas-like infections with Streptococcus haemolyticus in persons previously infected with filariae.

In addition to Wuchereria bancrofti, Oh (1929) reported 4 human cases of Acanthocheilonema perstans (Filaria perstans) and Kurahashi (1926) reported 1 human case of Dracunculus medinensis (Filaria medinensis) from Korea. No case of Wuchereria malayi has been reported from this country.

No experiment has been made on the mosquito transmission of filariasis in Korea. Yamada (1927) has shown that Wuchereria bancrofti attained its full development in the following seven Japanese mosquitoes which are present in Korea, viz., Aedes togoi, Culex pipiens pallens, Culex vagans (C. tipuliformis), Culex whitmorei, Culex sinensis, Culex tritaeniorhynchus and Anopheles sinensis.

Chapter III. MALARIA

Malaria is prevalent throughout Korea, including the most northern region, and has become more so during the war years. According to official reports (Anon., 1937, 1940) no deaths occurred in Korea due to malaria in 1935, but by 1938, the death toll had risen to 1,123. Hamhŭng of Hamgyŏng-namdo, and Taejŏn of Ch'ungch'ŏng-namdo appear to be the more endemic regions. In general, the disease is more prevalent in the southern part of the peninsular than it is in the northern part.

In June 1927 Tanabe (1927) performed blood examinations, by using the thick film method, on 282 school children in Ch'unch'ŏn and on 439 school children in Ch'ŏrwŏn, and observed that approximately 5 per cent of the former group and 13.7 per cent of the latter group were positive for plasmodia.

In 1929 the morbidity rate for malaria among soldiers in P'yŏngyang was estimated to be 2.2 per cent with a tendency toward increasing incidence in this area (Tsugawa, 1930).

In the Severence Union Medical College Hospital, Seoul, Choy (1936) reported malaria cases, proved by blood examination, in a 6-year period (see table 4).

TABLE 4. MALARIA CASES IN THE SEVERANCE UNION MEDICAL COLLEGE HOSPITAL, SEOUL, 1930-35.

Year	Number Examined	Number Positive	Per-cent
1930	345	57	16.5
1931	228	26	11.4
1932	131	13	9.9
1933	201	15	7.5
1934	248	17	6.9
1935	127	13	10.2
Total	1,280	141	11.0

Osawa (1927) reported that between 1922 and 1926 an annual average of 222.2 malaria patients were hospitalized from the Kankō (Hamhŭng) Infantry Regiment, in northern Korea, and that the disease was constantly on the increase in this area. The disease is most prevalent during the months from July to September. The seasonal distribution of malaria patients in the military hospital in Hamhŭng, as reported by Osawa (1927), is shown in table 5.

TABLE 5. SEASONAL DISTRIBUTION OF MALARIA PATIENTS IN THE KANKŌ (HAMHŬNG) MILITARY HOSPITAL, 1922-26.

Month	Year					Average %
	1922	1923	1924	1925	1926	
January . .	-	3	5	1	-	1.8
February . .	-	2	-	-	-	0.4
March . . .	-	1	-	-	-	0.2
April	1	4	2	13	6	5.2
May	16	19	10	22	16	16.6
June	35	27	19	28	30	27.8
July	25	48	20	24	43	32.0
August . . .	38	17	47	92	54	49.6
September .	45	40	57	76	79	59.4
October . .	9	28	16	13	30	19.2
November .	4	22	3	4	1	6.8
December .	3	10	2	1	-	3.2
Total . .	176	221	181	274	259	222.2

Vivax-malaria is the most common form of malaria in Korea although malariae- and falciparum-malaria have also been reported.

Malariae-malaria was first discovered in Korea in 1930 in a group of 14 cases from Sŏsan, Ch'ungch'ŏng-namdo. By the end of 1931 a total of 40 cases were observed in the same Province (Takagi, 1931). According to Takagi (1931) the ratio of vivax-malaria to malariae-malaria was approximately 100 to 15 or 16. In 1933 Kim et al. reported 5 cases from Kyŏnggi-do (Shiiba et al. 1936).

In 1936 Shiiba et al. (1936) first noted a case of falciparum-malaria in the Municipal Sunhwa Hospital in Seoul. The case was proved by the findings of crescent forms in the blood of the patient. However, the patient could have contracted the disease elsewhere because prior to 1932 he had travelled to Ōsaka, Japan. Two more cases were found later in Seoul by Nakanishi et al. (1936) among typhoid patients. Kō (1936) reported 1 case from Haeju, Hwanghae-do, and remarked that it was contracted in Korea. Tanabe (1939) revealed 10 cases in 1939 through blood examination. Apparently falciparum-malaria, even though introduced into Korea, might have established itself in this country.

Malaria vectors in Korea.--Five species of anopheline mosquitoes have been reported from Korea (see ch. X), but it has been proved that only Anopheles sinensis is the malaria vector in this country. The seasonal prevalence of this mosquito in the malaria endemic areas coincides with that of the disease, i.e., from July to September (Osawa, 1927). This mosquito breeds in permanent water with growing grasses and algae. In Korea the rice field is the most important breeding place for this mosquito.

Chapter IV. TYPHUS, RELAPSING FEVER, AND OTHER ARTHROPOD-BORNE DISEASES

1. Typhus Fever

Typhus fever is widespread in Korea and is more common in the central Provinces of the country. From 1931 to 1940 a total of 11,048 cases with 1,275 deaths was officially reported for Korea (Anon., 1935, 1943; Takahashi, 1941), averaging over 1,100 cases with 127 deaths annually. The disease has been reported separately since 1912, and the early reports often did not differentiate typhus from typhoid. Both endemic typhus (murine typhus) and epidemic typhus (louse-borne typhus) have been noted in Korea (Ludlow, 1943), although official reports do not differentiate these two forms of the disease. However, it is believed that the official figures represent almost exclusively cases of the louse-borne type. Table 6 shows the provincial distribution of the disease from 1926 to 1930 (Takida, 1932).

Typhus fever is most prevalent in Kyŏnggi-do. In Seoul, 490 cases of the disease were reported in the 5-year period, 1924 to 1928 (Matsuoka, 1929). Nakanishi et al. (1935) reported 33 cases with 1 death in Seoul in the spring of 1935, the majority of the cases occurring in May. The disease was epidemic in the city of Seoul in January 1939 and in Kŭmhwa, Kangwŏn-do at the end of 1938 (Kyo et al., 1939).

A captured Japanese medical report of April, 1944 states that with the advent of cold winter weather, typhus had broken out in Korea and was spreading to the Japanese mainland. This outbreak presumably occurred during the winter of 1943-44. An intelligence report indicates that an epidemic of typhus occurred in Hamhŭng, northern Korea, in 1945 and that several hundred deaths occurred each day during the epidemic.

Typhus fever occurs throughout the year but the incidence is higher in the months from January to June. The highest incidence occurs in the 15 to 25 year age group. Table 7 shows the monthly distribution of cases and deaths from 1926 to 1930 (Takida, 1932).

The body louse, Pediculus humanus, which is the principal vector of epidemic typhus, is widespread in Korea. It is especially common among the poorer class of people.

TABLE 6. PROVINCIAL DISTRIBUTION OF TYPHUS FEVER, 1926-30.

Province	1926	1927	1928	1929	1930	Total
Kyŏnggi-do	998	669	1,216	434	826	4,143
Ch'ungch'ŏng-pukto	56	96	326	220	138	836
Ch'ungch'ŏng-namdo	6	3	112	21	66	208
Chŏlla-pukto	1	6	1	1	-	9
Chŏlla-namdo	2	-	-	-	1	3
Kyŏngsang-pukto	56	8	1	2	-	67
Kyŏngsang-namdo	-	-	-	1	9	10
Hwanghae-do	89	90	50	138	237	604
P'yŏngan-pukto	14	23	5	10	9	61
P'yŏngan-namdo	1	4	-	54	2	61
Kangwŏn-do	10	43	44	260	369	726
Hamgyŏng-pukto	-	4	9	14	10	37
Hamgyŏng-namdo	6	6	4	9	16	41
Total	1,239	952	1,768	1,164	1,683	6,806
Total deaths	136	84	195	128	192	735

TABLE 7. MONTHLY DISTRIBUTION OF TYPHUS FEVER IN KOREA, 1926-30 (per 1,000)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cases	94	173	147	138	186	155	47	17	9	14	19	34
Deaths	123	165	177	112	129	143	57	19	11	23	7	24

Ratfleas which are responsible for the spread of endemic typhus are also common on the house rats, principally Rattus norvegicus. The principal species of ratfleas reported are Xenopsylla cheopis, Monopsyllus anisus (Ceratophyllus), and Leptopsylla musculi (Nagahana, 1937, 1938).

2. Relapsing Fever

Relapsing fever was fairly common in Korea (Avison, 1925). During April and May 1913, 30 cases of the disease were diagnosed among 200 admissions to the Severance Hospital, Seoul, and about 300 cases were reported in a period of 20 years. Most of the cases were from the poor people (Ludlow, 1943). According to Cho (1938) there were no relapsing fever cases in Seoul district from 1921 to 1933. An epidemic broke out in 1934 and 1935 with 54 cases and 4 deaths observed in 1 hospital, 38 of the cases occurring from April to July.

Relapsing fever in Korea is principally a disease of males. Of the 54 cases reported by Cho (1938), 52 were males and 2 were females. Ludlow (1943) reported the sex ratio as 1 female to 10 males. The majority of the patients were between the ages of 11 and 30 years.

The causative agent of the disease in Korea is Spirochaeta recurrentis and the vector is the human body louse which is widespread in Korea and particularly common among the poor people. There is no information regarding the presence of the tick-borne form of the disease.

3. Other Arthropod-Borne Diseases

Plague has never been prevalent in Korea although it is rampant from time to time in neighboring China. According to the statistics of the Government General of Korea and the reports of the League of Nations, Korea has been free from plague for many years. This is attributed by some authors to the heating system practiced by the people which diminishes to some extent the rat infestation in the house.

Kala azar is not known in this country except for occasional cases brought in from China. However, due to the proximity of this territory to Manchuria and the Shantung Province of China, its introduction would not be surprising.

The presence of scrub typhus (tsutsugamushi disease) in Korea is doubtful. Weir (1915) reported 15 cases of a "continued fever" in Korea in 1913 and 1914 which was regarded by some as tsutsugamushi disease. However, Farner and Katsampes (1944) considered this interpretation as unjustified on the basis of the description of this unknown fever.

Nakamura et al. (1935) reported 77 cases of "eruptive fever" in the P'yŏngyang region and stated that this disease differs from typhus fever in that: (1) it is sporadic; (2) it is rarely contagious among family members; (3) it is without cerebral symptoms or hemorragic eruption; and (4) the prognosis is better. Nevertheless, this description is not sufficient to indicate the true nature of this disease. It was reported that the disease occurs throughout the year but is more common during the months from October to December. Sūo and Ichihara (1939) reported that a so-called "ho-nam fever" is endemic in Chŏlla-namdo but the real status of this disease is not clear.

Japanese "B" encephalitis has not been reported in Korea although the mosquito vectors of the disease, Aëdes togoi, Culex tritaeniorhynchus and C. pipiens pallens, are present. Once the disease is introduced, if not already present, its spread is to be expected.

Tick-borne encephalitis transmitted by Ixodes persulcatus, has been reported from various areas in the far eastern parts of the U.S.S.R. Neither the disease nor its vector has been reported from Korea, but its introduction is probable.

Tick-borne typhus fever, caused by an undetermined Rickettsia and transmitted by the tick Dermacentor nuttalli, has been reported in the far eastern part of the Soviet Union since 1936. Outbreaks have occurred in Vladivostok, about 80 miles from the Korean border. The disease has not been reported from Korea but its occurrence in the northeastern regions is very likely. Haemaphysalis concinna, a suspected tick vector is found in Korea.

Chapter V. ACUTE INFECTIOUS DISEASES

1. Diphtheria

Diphtheria is one of the most common infectious diseases in Korea and is one of the principal causes of mortality in children. From 1932 to 1939, a total of 14,230 cases with 3,452 deaths was officially reported in the whole country, averaging over 1,778 cases with 431 deaths annually (Takahashi, 1941). In 1940, 2,723 cases with 557 deaths were reported (Anon., 1943). The disease occurs throughout the year but is more prevalent during the cold season from December to May. Table 8 shows the monthly distribution of diphtheria cases and deaths from 1926 to 1930 (Takida, 1932).

Ochiai (1940) showed that 59.4 per cent of the diphtheria deaths between 1933 and 1937 occurred in the months from December to April. However, in Seoul, the highest incidence of the disease in 1930 to 1936 occurred from September to March (Shiiba et al., 1938).

Children are more susceptible to this disease than adults. Shiiba et al. (1938) reported that of 526 cases treated in the Municipal Hospital, Seoul, 481 (91.4 per cent) were under the age of 16 years. The highest incidence falls between the ages of 2 and 4 years. Takida (1932) tabulated the age incidence of diphtheria in 1926 to 1930 as in table 9.

The mortality rate of the disease varies with different years and is much higher among the Koreans than among the Japanese, being 39.4 and 13.0 per cent respectively from 1931 to 1935 (Shiiba et al., 1938).

TABLE 8. MONTHLY DISTRIBUTION OF DIPHTHERIA, 1926-30

(per 1,000)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cases . .	100.6	104.7	128.8	114.0	96.4	64.8	41.4	37.8	53.0	77.3	83.0	98.8
Deaths .	105.0	125.2	138.1	101.8	83.2	63.0	47.7	46.9	40.3	69.5	78.3	101.0

TABLE 9. AGE DISTRIBUTION OF DIPHTHERIA, 1926-30.

(per 1,000)

Age	Cases	Deaths
Under 5 years .	569.7	693.6
5 to 9 years .	311.4	265.7
10 to 14 years .	68.7	26.7
15 to 19 years .	19.5	4.3
20 to 24 years .	13.5	4.3
25 to 29 years .	4.8	1.1
30 to 39 years .	5.2	2.1
40 to 49 years .	2.0	1.1
50 to 59 years .	0.4	1.1
60 and over . . .	1.6	
Unknown	0.6	

2. Scarlet Fever

Scarlet fever has existed in Korea since ancient times. From 1910 to 1930, a total of 12,762 cases with 2,874 deaths was reported (Takida, 1932). Official sources (Anon., 1935, 1941, 1943) showed that 12,188 cases of scarlet fever with 1,300 deaths occurred between 1931 and 1940; a decrease both in incidence and case fatality rate is noted in the last 3 years of this period. The death rate for scarlet fever among the Japanese in Korea is reported to be 0.8 per 10,000 in 1933 to 1937 (Ochiai, 1940), but according to Shiga (1927) the Japanese living in Korea are far more susceptible to the disease than the Koreans, the death rate being 2.77 to 6.77 per 10,000 for the Japanese against 0.02 to 0.24 for the Koreans.

The disease is mainly a disease of children. According to Takida (1932), during 1910-30, 24.0 per cent of the scarlet fever cases in Korea and 40.2 per cent of the deaths occurred among children under 5 years of age, 38.0 per cent of the cases and 38.8 per cent of the deaths between the ages of 5 and 9 years, and 18.8 per cent of the cases and 11.9 per cent of the deaths between the ages of 10 and 14 years.

No specific month of the year is entirely free from the disease although it is more prevalent during the cold season. According to Takida (1932) more than 40 per cent of the cases and more than 41 per cent of the deaths occurred in the first 4 months of the years from 1910 to 1930. Ochiai (1940) showed that more scarlet fever deaths occurred from December to May for the years 1933 to 1937, with the peak in February. Yamamoto et al. (1939) reported that the number of cases of scarlet fever in Seoul began to increase from October to March and gradually decreased in April and May.

Dick tests were made on 30,266 school children in Seoul from 1926 to 1929; 11,878 gave positive reaction, representing 35.94 per cent (Takida, 1932). Shiga (1929) stated that the result of the Dick test shows that the Koreans are less liable to the disease than the Japanese. The positive reaction among the Koreans to the skin test made by Mizushima and Hironaka shows it to be only one-half of that found among the Japanese.

3. Smallpox

Smallpox has been known in Korea since ancient times and has been one of the most important causes of mortality. In 1920 a total of 11,500 cases with 3,500 deaths was reported,

8,316 cases in 1921, 3,676 in 1922, and 3,722 in 1923 (Anon., 1936).

Vaccination regulations were promulgated in Korea in 1923. The law requires the Korean people to be vaccinated three times during the lifetime. The first vaccination is administered between the ages of 6 months and 1 year, the second at the age of 6, and the third at the age of 12 (Takida, 1932). Due to this fact the number of cases greatly decreased until 1932 and 1933 when a marked increase was noted, 2,787 and 4,928 respectively being recorded (Anon., 1936). The disease again became epidemic in 1849 when 3,264 cases with 629 deaths were reported (Anon., 1943).

In Korea smallpox is principally a disease of children; 34.6 per cent of the cases in 1926-30 were children under 5 years of age (Takida, 1932). Van Buskirk (1927), based on a survey of 9,325 infant deaths, showed that smallpox caused the highest number of deaths.

The disease is most prevalent in late spring. According to Takida (1932) 69.7 per cent of the cases and 68.3 per cent of deaths between 1926 and 1930 occurred in the months from February to May. The disease greatly decreases in June and reaches its minimum in September, October, and November.

The morbidity of smallpox among the Japanese in Korea was 12 times as high as that in Japan (Takida, 1932).

4. Epidemic Cerebrospinal Meningitis

Due to frequent epidemic outbreaks of this disease it has been considered a reportable disease in Korea since 1924. During the 7-year period, 1924-30, 390 cases with 230 deaths were reported among the civilians and 19 cases in the Korean Army (Takida, 1932). The disease was more prevalent in 1934 and 1935 when approximately 500 cases and 300 deaths were reported yearly. Table 10 shows the annual distribution of the disease for a 10-year period, 1931 to 1940 (Anon., 1935, 1941, 1943).

TABLE 10. CASES AND DEATHS OF EPIDEMIC CEREBROSPINAL MENINGITIS, 1931-40.

Year	Cases	Deaths	Fatality rate percent
1931	104	58	55.77
1932	113	55	48.67
1933	128	59	46.09
1934	499	264	52.91
1935	517	272	52.61
1936	323	163	50.46
1937	189	115	60.85
1938	369	210	56.91
1939	99	45	45.45
1940	153	77	50.33

5. Trachoma

Trachoma is very common in Korea. Miyashita (1929) reported that 3,492, or 6 per cent, of 57,851 Korean school children examined in 1917 were found to be affected with trachoma and that 15.6 per cent of the patients afflicted with eye diseases from 1925 to 1927 were suffering from this disease. The infection rate was higher among the Japanese (20.1 per cent) than among the Koreans (12.4 per cent).

Gear (1934) showed that 106 out of 6,905 patients in the Severance Hospital, Seoul, in 1933, were trachoma cases.

Trumura (1939) made an investigation on the hygienic conditions in the mines in Hwanghae-do and found that 9.9 per cent of the mine workers were positive for trachoma.

6. Other Acute Infectious Diseases

Erysipelas is fairly common in Korea. Jinnai and Fujii (1937) reported that of 1,740 inpatients treated in Ryusan (Yongsan) Railway Hospital from 1929 to 1935, 108 were cases of erysipelas, representing 6.2 per cent. Ten (9.26 per cent) of the cases were fatal and 23.2 per cent of the patients were between 1 to 10 years of age. Sixty cases of erysipelas were treated by the Department of Skin Diseases, Red Cross Hospital, from 1931 to 1939, representing 0.26 per cent of the total patients in the Department (Hanasono et al. 1940). The majority of the patients (32) were between 1 to 10 years of age and the disease seems to increase among the old-age people. Out of this series there was only 1 death.

Measles is common in Korea and often becomes epidemic. An early report (Mills, 1911) stated that in an epidemic in 1910 about 1 per cent of the population of the city of Kangkai (probably Kanggye), on the northern border of Korea, died in a period of 2 months from measles averaging a child case in every second house. An epidemic was recently reported in P'yŏngyang on the latter part of 1945.

Pertussis (whooping cough) is also a common disease among children in Korea. In a 1-year period over 300 cases were admitted to the Pediatric Department of the Korean Government Hospital, Seoul (Tokunaga, 1927).

Erythema infectiosum (the fifth disease) is also present in Korea. The earliest report of the disease in this country was by Kataoka (Sano and Fukuda, 1933) who reported that several cases were observed in Seoul during the winter of 1921-22. Sano and Fukuda (1934) reported 18 cases in the Ryusan (Yongsan) Railway Hospital from November 1932 to

July 1933. Most of the cases occurred between the months from December to February. Children between 4 and 8 years of age proved to be more susceptible to this disease. The incubation period is 6 to 14 days.

Epidemic Encephalitis was reported from Seoul and Chŏlla-pukto (Yoshiwara, 1932).

Rabies is reported to be common in Korea. In 1938 (Takahashi, 1941) 81 rabid cases were reported, 70 Koreans and 11 Japanese. There is no information available regarding the number of rabid dogs.

Tetanus is a fairly common infection in the peninsula. According to an official report (Takahashi, 1941) 63 cases of tetanus were found in 1938, 52 Koreans and 11 Japanese. Thirty-six of the cases were male and 27 female.

Anthrax epidemics appeared among cattle in nearly every Province, although no human cases were reported. (Mills, 1911). Glanders has occurred among the animals in the Zoological Garden in Seoul (Nakamura et al. 1935).

Chapter VI. CHRONIC DISEASES

1. Tuberculosis

Tuberculosis is very widespread in Korea and constitutes one of the most serious public health problems. It is present in all forms with the pulmonary infection most frequently encountered. Japanese official sources estimated that the number of tuberculous cases among Koreans amounted to approximately 470,000 and that the number of deaths exceeded 50,000 annually (Takahashi, 1941). According to the statistics of the Korean Government the average death rate due to tuberculosis among the Japanese in Korea was 315.95 per 100,000 in 1928-37, ranging from 202.8 in 1930 to 441.0 in 1936 (Taniguti, 1939). K. Sai (1936) shows that about 75.6 per cent of all the tuberculous cases among the Japanese in Korea were due to pulmonary infection. Ochiai (1940) showed that in 1933-37, out of every 327 tuberculosis deaths among Japanese, 229 died from pulmonary tuberculosis. S. Sai (1934) reported 576 cases of tuberculosis of joints in the Provincial Kōshū (Kwangju) Hospital for a period of 10 years, 1923-32, representing about 0.02 per cent of the total admissions.

Rhi and Tei (1934) showed that 34.5 per cent of Korean children gave positive tuberculin reaction. Among 353 boys and 293 girls in public schools in Seoul, 1 to 12 years of age, who were injected intracutaneously with 0.1 cc. of old tuberculin of 1:6,000 strength, 117 (33.1 per cent) of the boys and 106 (36.3 per cent) of the girls showed red infiltrations of over 1.0 cm. in diameter. The tuberculin positive children are in general thin or of asthenic constitution.

2. Leprosy

Leprosy is prevalent in Korea and information indicates that the number of cases is increasing from year to year (Avison, 1942). The disease is widespread but is especially common in the southern part of the peninsula. Avison (1942) reported that approximately 16,000 lepers were taken care of in three mission-operated colonies and one Government leprosarium. Takahashi (1941) reported that in 1940 more than 5,000 cases were cared for in the Government

Leprosarium on Sorok Island and approximately 2,000 were in the mission-operated colonies at Taegu, Yŏsu, and Pusan.

A total of 261 cases of leprosy were treated in the Dermato-Urology Department of the Medical College, Keijo Imperial University from 1928 to 1932, representing 0.94 per cent of the total number of patients of skin diseases, the number of cases is considerably increased at the age of puberty; 35 per cent being between 10 and 20 years of age, 30.8 per cent between 21 and 30, and 13.3 per cent between 31 and 40. The majority (200) of the cases were male.

The neural form is more frequent than the other forms representing 77.5 per cent; lepromatous form 9.2 per cent; and mixed form 12.9 per cent. About 1 per cent of the cases had complications with other skin diseases. Most of the cases were farmers from the southern part of the country.

3. Skin Diseases

Dermatomycoses are common throughout Korea. In Seoul, Araki (1941) isolated 91 Trichophyton strains from ambulatory patients from the voluntary polyclinic. Eight species of fungi were found, they were: Microsporon japonicum, M. audonini, Epidermophyton inguinale, Trichophyton purpureum, T. coccineum, T. gypseum, T. interdigitale, and T. pedis. The patients were from the Provinces of Kyŏnggi-do, Kangwŏn-do, Hwanghae-do, and Ch'unch'ŏng-namdo.

Arimoto (1941) reported that 50,492 outpatients with skin diseases were treated from 1930 to 1939, and 289 were psoriasis cases. Most of the cases occurred during the spring season.

Chapter VII. VENEREAL DISEASES

Since the advent of the Japanese in Korea and the establishment of brothel districts in the cities, venereal diseases have been on the increase in this country.

Niwa (1927) investigated three groups of Japanese and Korean girls (prostitutes, waitresses, and geisha girls) and found that 2.04 to 3.92 per cent were infected with venereal diseases. The infection rate is higher among the Koreans than among the Japanese, being 3.99 and 2.52 per cent respectively. The highest morbidity occurs among the prostitute group, being 1.73 to 3.94 per cent among the Japanese and 2.56 and 5.66 per cent among the Koreans. Gonorrhoea is the most common of the venereal diseases. Table 11 was obtained by Niwa (1927) from the three groups investigated.

Gear (1935) showed that 5.9 per cent of the total admissions in the Severance Hospital, Seoul, in 1933 were venereal diseases. Of the 1,020 venereal disease cases observed at this time, 488 were cases of gonorrhoea and 442 syphilis.

Ushijima (1934) reported 5 cases of lymphogranuloma inguinale (the fourth disease) from Seoul.

Blood sera from 1,202 apparently healthy persons were tested for syphilis and 303 (25.12 per cent) gave positive Wassermann reaction (Sai, 1939). A recent report shows that 7 to 15 per cent of individuals over 15 years of age in Seoul have a positive serologic reaction for syphilis by the Ide technique. In one series of examinations of Seoul prostitutes, 90 out of 105 examined were found to have venereal diseases.

Studies supervised by the military government indicated that of 92 prostitutes examined, 90 per cent were found to have positive serological results for syphilis, and 62 per cent were infected with gonorrhoea. In the Pusan area, 176 licensed prostitutes were given repeated examinations from January to July 1945, and 68 were diagnosed, on serology, as having syphilis, 68 gonorrhoea, 20 chancres, and 20 chancroids.

Control measures, consisting of education, examination, and treatment have been instituted by engaging the cooperation of both the occupation forces and the civilian population.

TABLE 11. INCIDENCE OF VENEREAL DISEASES AMONG 3 GROUPS OF KOREAN AND JAPANESE GIRLS (in per cent)

Diagnosis	Koreans	Japanese	Average
Gonorrhoea .	2.21	1.69	1.88
Chancroid . .	1.12	0.58	0.76
Syphilis . . .	0.66	0.25	0.39

Chapter VIII. HELMINTHIASES

1. Paragonimiasis

Paragonimiasis is one of the most important endemic diseases in Korea and is found in all parts of the country. Wherever the disease is prevalent more than half of the population is infected (Kobayashi, 1933). Nagai (1923) examined 180,351 Koreans from all over the country and found 16,866 or 9.4 per cent, carrying eggs of Paragonimus westermani. These were distributed according to the Provinces as in table 12.

The disease is most common among the farmers. Paragonimus westermani is very prevalent in Korea due to the Korean habit of eating raw crabs and crayfish which serve as the second intermediate host of the parasite. The crabs Eriocheir japonicus and Sesarma dehaani and the crayfish, Cambaroides similis and Cambaroides dauricus, in Korea are incriminated as being the second intermediate hosts. Eriocheir inhabit all types of water, rice fields, ponds, streams, etc. The crabs from streams are usually found to be more infected. This crab hatches in the spring, migrates upstream in March and April, and downstream in late summer and autumn when they are captured. Cambaroides similis is found in the southern part of Korea whereas C. dauricus is found in the northern part.

In 1923 an order was issued by the Government prohibiting the use of crabs and crayfish as food to prevent the spread of the disease.

The snails of the family Thiaridae (Melanidae) serve as the first intermediate host of the parasite. Six species of these snails have been recorded in Korea, viz., Semilsulcospira gottschei, S. coreana, S. forticosta, S. paucicincta, S. nodifila and S. libertina. All of these species with the possible exception of coreana are known to be the intermediate host of Paragonimus westermani by experimental examination. The distribution of the snails coincides with that of paragonimiasis in Korea (Kobayashi, 1928). Their habitation is usually the streams.

TABLE 12. DISTRIBUTION OF PARAGONIMUS WESTERMANI AMONG KOREANS, 1923

Province	Percent infected
Kyŏnggi-do	10.4
Ch'ungch'ŏng-pukto	4.2
Ch'ungch'ŏng-namdo	14.4
Chŏlla-pukto	14.3
Chŏlla-namdo	46.0
Kyŏngsang-pukto	6.2
Kyŏngsang-namdo	1.5
Hwanghae-do	23.1
P'yŏngan-pukto	2.9
P'yŏngan-namdo	18.7
Kangwŏn-do	3.3
Hamgyŏng-pukto	0.2
Hamgyŏng-namdo	12.4
Average	9.4

2. Clonorchiasis and Other Trematodiases.

Clonorchiasis is widespread in Korea and it rates next in importance to Paragonimiasis, the most important fluke infection in the peninsula. The infestation of Clonorchis sinensis is heavier in the southern part of the country, especially, in the lowland among the rivers. Numerous cases were reported from Kyongsang-pukto and Kyŏngsang-namdo. In certain regions in Chŏlla-pukto it prevails endemically and many cases were found in Hamp'yŏng and Kwangju of Chŏlla-namdo (Kobayashi, 1924). Furuyama (1927) reported that an average of 20 per cent of the inhabitants in Ch'angnyŏng District, Kyŏngsang-namdo were found to be infected with Clonorchis sinensis. Miwa (1935) found 6 per cent positive for the parasite among 862 persons examined in Mokp'o District, Chŏlla-namdo. Chiba (Kobayashi et al. 1929) reported that 10 per cent of 185 Korean soldiers examined in Seoul were positive for the parasite when 6 examinations were made in each case. Yamazaki (1936) showed a positive rate of 1.2 per cent in Suwŏn, 3.3 per cent in Yongin and 8.3 per cent in Chinwi. Oda (1929) showed that 23.3 per cent of 1,600 persons examined in Chŏnju District, Chŏlla-pukto, were found to carry eggs of C. sinensis. The disease is prevalent in the entire valley of Naktong River and 5 localities along the valley were

found to be endemic for the fluke, viz., Andong, Ch'angnyŏng, Chinyong, Chinju and Taegu (Kobayashi, 1927).

Two species of Bulimus snails are found in Korea, B. striatulus japonicus and B. kiusiuensis Hirase. The first species, B. stratulus japonicus, is found to be naturally infected with C. sinensis. It has a wide distribution in the country and corresponds with that of the liver fluke (Kobayashi, 1928). The role of B. kiusiuensis, as an intermediate host of C. sinensis, has not been ascertained.

Cyprinoid fishes serve as the second intermediate host of the fluke. The following species were found to be infected with the encysted larvae of the fluke in Korea: Pseudorasbora parva, Sarcocheilichthys morii, Acanthorhodeus gracilis, Abbottina psegma, Leucogobio striatus, Leucogobio coreanus, and Leucogobio sp. (Kobayashi, 1924).

Cats and dogs are the most important reservoir hosts of C. sinensis and rats may also serve to a minor degree. Kobayashi (1924) reported that 150 specimens of C. sinensis were discovered from a kolinsky, Lutreola siberica, captured near Seoul.

Other Trematodiases.--Metagonimus yokogawai is fairly common in Korea. High percentage of incidence of this fluke was found in the fecal examinations in Ch'angnyŏng by Furuyama and in Kyŏngsang-pukto, Kyŏngsang-namdo, and Kangwŏn-do by Government doctors (Kobayashi, 1928). Chiba (1928) found that certain vegetables obtained in Seoul were contaminated with eggs of the fluke. Heavy infestation of cysts of the fluke was also found in fishes in Ch'angnyŏng by Furuyama according to Kobayashi (1928). Oda (1929) reported that 12 (0.8 per cent) of 1,600 persons examined in Chŏnju District, Chŏlla-pukto carried eggs of M. yokogawai.

There are no autochthonous cases of Schistosomiasis japonica reported in Korea. According to Kobayashi (1928) the two cases reported by Ludlow were misdiagnosed. No human case of Fasciola is reported in Korea although Fasciola gigantica is common among cattle in this country. Heterophyes infection is not rare in Korea (Kobayashi, 1933). Eurytrema pancreaticum is found in four mammals, viz., cattle, Lepus corcanus, Capreolus bedfordi, and Hydropotes argyopus.

3. Nematodiases

Ancylostomiasis.--Hookworm infection is common in Korea. In general, the incidence is higher in the southern

part of the peninsula. The highest incidence was reported from Chŏnju District, Chŏlla-pukto by Oda (1929) who examined 1,600 persons and recorded 54.4 per cent of them carrying hookworm eggs, and from the Suan Mine Hospital where more than 58 per cent of the patients examined were positive for the parasite (Stryker, 1914). An average of 20 to 30 per cent of the population of southern Korea are infected. In the northern part of the peninsula the infection is infrequently seen. However, Hasimoto (1927) reported high infection in 2 areas of Hamgyŏng-pukto, the most northern Province of Korea, Puryŏng and Kyŏngwŏn Counties where 46.9 per cent and 10.6 per cent, respectively, were found infected. Both Ancylostoma duodenale and Necator americanus were found in Korea, the former being more common than the latter.

Ascariasis.--In Korea ascariasis is very common and widespread. The incidence of infection varies with different localities and groups of population. In general, the infestation is heavier in the southern part of the peninsula. The infection is heaviest among the school children, of whom over 90 per cent (sometimes 100 per cent) are found to be infected. Ascaris eggs were found commonly on the vegetables obtained in Seoul. Mature eggs were found in all months of the year (except March) being most numerous during August and least in January and February (Chiba, 1928).

Trichuriasis.--Trichuris trichiura is also very common in Korea and its incidence is often higher than that of A. lumbricoides. Oda (1929) showed that whipworm infection was the highest of all helminths among 1,600 persons examined in Chŏnju District. A large number of whipworm eggs was also found on the vegetables in Seoul by Kobayashi (1927). This parasite is also more common in the south than in the north.

Other Nematodiases.--Other nematode infections reported in Korea are: Trichostrongylus orientalis common in central Korea; Strongyloides stercoralis, found in central and southern parts; Enterobius vermicularis, 3 to 5 per cent infection reported from fecal examination; and Thelazia callipaeda, one case reported from Hwanghae-do (Nakata, 1934). No human case of Trichinella spiralis was reported from Korea. Nakata (1935) reported a species of Rhabditis identified as R. usuii Watanabe (1927) found in the fecal specimen of a Korean in Seoul.

For filariasis in Korea see chapter II.

4. Cestodiases

Tapeworm infection is reported to be fairly common in Korea. Kobayashi et al. (1929) reported that in Seoul 1 per

cent of tapeworm infection was found by Furuyama and 8 per cent by Chiba. In the latter report 6 examinations were made in each case. Trumura (1939) reported a morbidity of 1.9 per 10,000 for tapeworms among the mine workers in Kwanghae-do from 1935 to 1938. Miwa (1935) reported that 0.9 per cent of 596 persons examined in Kanggye District, P'yŏngan-pukto and 3 per cent of 862 persons examined in Mokp'o District, Chŏlla-namdo were infected with tapeworms.

Taenia saginata is the most important cestode in Korea and most of the reported tapeworm infections were caused by this species. Stryker (1914) reported that 37 cases of tapeworm infection were treated in the Suan Mine Hospital in 1913, and that all were due to Taenia saginata. Taenia solium was reported as common in Korea but Kobayashi (1933), one of the outstanding parasitologists in Korea, claimed that he had not found a single case of this parasite during his 17 years' tenure in this country. However, veterinary inspectors in northern Korea often reported the presence of Cysticercus cellulosae in pork (Kobayashi, 1928).

Diphyllobothrium latum is said to be the second important tapeworm in Korea, although no specific information as to its incidence is available. Over 10 human cases of Diphyllobothrium mansoni (Sparganum) have been reported in Korea (Kobayashi, 1933; Miyazaki, 1941). Two cases of hydatids caused by Taenia echinococcus were reported in Korea (Kobayashi, 1928). Infection of Hymenolepis nana was said to be rare, only 3 human cases were reported (Ogura, 1933).

Chapter IX. INTESTINAL PROTOZOA

Intestinal protozoa are prevalent in Korea. Chiba (1931) made fecal examinations for intestinal protozoan infections on 200 patients and 185 Korean soldiers in Seoul and found that 53 per cent of the former and 94.6 per cent of the latter harbor one or more species of protozoa.

Endamoeba histolytica is the most important intestinal protozoa in Korea. All surveys on intestinal protozoa in Korea show a high per cent of infection of this species. Kessel (1925) in Seoul reported a 41 per cent incidence among the Koreans and 25 per cent incidence among the foreigners. Sai in 1926 reported a 30.2 per cent incidence in Seoul and Hwanghae-do (Kobayashi, 1928). Chiba (1931) showed that 12.5 per cent of 200 patients and 47.0 per cent of 185 Korean soldiers in Seoul were infected with Endamoeba histolytica. Liver abscesses due to E. histolytica are occasionally seen. Chronic amoebic dysentery is fairly common and widespread in Korea.

Balantidium coli is found in 20 per cent of pigs in Seoul and vicinity but is not reported in man. Over 75 per cent of Koreans were found to harbor Endamoeba coli. Trichomonas hominis is prevalent in Korea; and 12 per cent of Japanese and 4 per cent of Koreans are infected with this species (Kobayashi, 1928).

Other intestinal protozoa found in Korea includes Endolimax nana, Iodamoeba bütschlii, Giardia lamblia, Chilomastix mesnili, and Dientamoeba fragilis. The result of some important surveys on intestinal protozoa in Seoul, is summarized in table 13.

TABLE 13. PREVALENCE OF INTESTINAL PROTOZOA IN SEOUL
(in per cent)

Composition of population	Koreans	Foreigners	Koreans	Koreans	Patients	Korean soldiers
Total number examined	153	59	2,000	334	200	185
Author	Kessel	Kessel	Sai	Sai	Chiba	Chiba
Number examinations .	6	6	1	6	1-6	6
Endamoeba histolytica .	41	33	1.5	30.2	12.5	47.0
Endamoeba coli	39	25	7.6	42.2	29.5	74.6
Endolimax nana	39	24	3.1	41.6	27.5	76.8
Iodamoeba bütschlii . .	14	6	0.9	16.4	3.5	24.9
Giardia lamblia	18	2.5	0.2	8.8	10.0	11.9
Trichomonas hominis .	23	16	3.6	4.1	4.5	1.1
Chilomastix mesnili . .	7	2	0.2	0.8	5.0	1.6

Chapter X. ARTHROPODS OF MEDICAL IMPORTANCE

I. MOSQUITOES (CULICIDAE)

A. Anopheles.

There are only five species of Anopheles reported from Korea, viz., sinensis, sinerpides, pullus, koreicus and edwardsi. The last two were recently considered by some Japanese workers as seasonal varieties in Japan (Hsiao and Bohart, 1946).

1. Anopheles sinensis Wiedemann, 1828. (Synonyms: Anopheles hyrcanus sinensis of authors; Anopheles yesoensis Tsuzuki, 1901). This is one of the most widespread Oriental species of Anopheles. Its range extends northward into Korea, Japan, and probably into Siberia. It is the most common species in Korea and has been collected from all over the country. In the early literature on Korean mosquitoes it was reported as Anopheles yesoensis which was first recorded from Hokkaido. It has been collected in Korea from the following localities: Andong, Chinhae-Man, Chinju, Ch'ŏngnyong-ni, Ch'unch'ŏn, Ch'ungju, Dok-do, Hamhŭng, Hoeryŏng, Inch'ŏn, I-ri, Kangdok, Kanggyŏng, Kŭmhwa, Kunsan, Kwangju, Kyeryong-san, Nanam, Namwŏn, Nonsan, Ongjin, P'yŏngch'ang, P'yŏngyang, Pusan, Sech'ŏn, Sinŭiju, Suwŏn, Taegu, Taejŏn, Wŏnju, Yŏngdŭngp'o, Yongsan, and Yŏnsan (Yamada, 1936).

The larvae of this species are found in almost any collection of ground water and occasionally even in artificial containers. They have been collected from the stagnant waters of rice fields, pools, swamps, marshes, ditches, slowly flowing streams, and etc. They are predominantly a clear water breeder and prefer habitats with abundant aquatic vegetation.

Anopheles sinensis is a domestic species and the adult invades houses and barns and bites during the night.

Inconsistency is observed in its feeding habits because in some areas it appears to be strongly zoophilic while in others it prefers the blood of man. Yamada (1936) tested 1,403 female specimens of this species which had been captured in and around the city of Seoul and obtained the result given in table 14.

TABLE 14. FEEDING HABITS OF ANOPHELES SINENSIS

Location	Number captured	Number with blood	Source of blood					
			Man	Cow	Horse	Pig	Dog	Chicken
Railway station .	1,057 (987♀)	204	163 (80.3%)	21 (9.9%)	15 (7.4%)	2 (1.0%)	2 (1.0%)	1 (0.5 %)
Dwelling houses .	177 (166♀)	42	23 (54.8%)	5 (11.9%)	13 (21.0%)	0	0	1 (2.38 %)
Livestock sheds . .	Unknown 2480 ♀	63	0	52 (82.5%)	3 (4.8%)	4 (6.3 %)	0	4 (6.3 %)

Table 14 indicates that while the species is anthropophilic no human blood was found among the mosquitoes collected from the livestock sheds. Adult females of this species overwinter and come out in March and April. Eggs are laid during the latter part of May and early June. The adults are to be found from June to September, being most numerous in July and August.

The role of this species in the transmission of malaria varies in several areas. In most parts of China it plays a minor role as vector of the disease. In Korea it is the main vector of Plasmodium vivax. Kobayashi (1932) stated that no other anopheline mosquito was found in Ch'ungch'ongnamdo which was a recently known endemic center of Plasmodium malaria.

The role of this mosquito as a vector of filariasis is well established. It is regarded as an intermediate host of Wuchereria bancrofti in China as well as in Indo-China and as an intermediate host of Wuchereria malayi in the Netherland Indies. In Japan, Yamada (1927) states that 261 filarial larvae were found in 16 females of this mosquito which had been fed with infected blood and were dissected 12 to 19 days after the feeding. Only 4.6 per cent of the larvae completed their development, indicating a low suitability as an intermediate host of Wuchereria bancrofti. In Korea no experiment has been conducted on the mosquito transmission of filariasis. Due to the presence of both the disease and Anopheles sinensis, this mosquito might play a minor role in the transmission of the disease in this country.

2. Anopheles sineroides (Yamada) 1924. This is a rather uncommon species and has been found in Japan (Honshu, Hokkaido), Korea, and northern China. In Korea it was first collected from Ch'ŏngyang-ni near Seoul in 1932, and subsequently was recorded from Nonsan, Kyeryongsan, Noryangjin, Taejŏn (Yamada, 1936), and Ch'ungch'ŏng-namdo (Kobayashi, 1939). The larvae of this species are found in cold spring pools, marshes, and running water. The adults have been caught in houses feeding on human blood. Yamada (1924) reported that only partial development of Wuchereria bancrofti was found in this species and there is no evidence of its being a vector of malaria.

3. Anopheles pullus Yamada, 1937. This is an endemic species of Anopheles in Korea. It is a rather rare species and has been collected from Nonsan, Sech'ŏn, and Sindo (Kobayashi, 1939). According to Yamada (1937) the larvae of this species breed in rather cool fresh water with aquatic vegetation. It begins to develop in April and May and again in September until November. In the summer months larvae can only be found in cool springs or pools and in the shade of trees on high land. This species is a vigorous biter and is apparently zoophilic as well as anthropophilic. Its role in transmitting diseases is not known.

4. Anopheles koreicus Yamada and Watanabe, 1918. (Synonym: Anopheles punctibasis Edwards). An uncommon species in Korea is Anopheles koreicus. It is distributed in Central China and Japan. In Korea it has been recorded from the following localities: Kyeryong-san, P'yŏngch'ang, Sech'ŏn, Taejŏn (Yamada, 1936); the vicinity of Keijo and Ch'ungch'ŏng-namdo (Kobayashi, 1939). The larvae of this species were found in ponds, marshes, muddy shaded pools, as well as in running water. Adults bite at night and have been collected from barracks. This species is not known as a vector of disease.

5. Anopheles edwardsi Yamada 1924. According to Miyao and Sasa (1944 (?)) this species and the preceding species (A. koreicus) were considered by Nakayama (1942) as seasonal varieties of one specific species. It has been recorded from Japan (Honshu) and Korea. It has been collected from the following localities in Korea: Ch'ungch'ŏng-namdo, Sech'ŏn (Yamada, 1936; Kobayashi, 1939). The larvae of this species breed preferably in cool water. The adults have been collected in early spring from under the roof of a cottage, indicating that this species possibly overwinters in the adult stage. It bites man readily after dark. It has no known role as a transmitter of disease.

KEY TO ANOPHELINE MOSQUITOES OF KOREA

I. ADULTS

1. Wing with less than four pale spots on costal margin 2
   Wing with four or more pale spots on costal margin 3

2. Costa with two pale spots, one at tip of subcosta and the other near the apex; apex of wing pale; fringe on posterior margin with one pale spot; hind tarsal I-IV apically banded . . . . . An. sinensis
   Costa with one or two pale spots, in two-spotted form, subcostal spot very small; wing without fringe spots or apical pale area; tarsi banded as in sinensis . . . . . An. pullus

3. Palpi entirely dark 4
   Palpi with four pale transverse rings; wing with four pale costal spots, the first and second small and near the base, the third large and near the junction of subcosta, and the fourth near the apex of wing; without basal pale bands on femora, tibiae and tarsi . . . . . An. sineroides

4. Wing with five pale spots on costal margin, two large ones on apical portion, a large one and two small ones on basal portion; fore tarsal III- V not pale banded . . . . . An. edwardsi
   Wing with four pale spots on costal margin, two large ones on apical portion and two small ones on basal portion; all fore tarsal segments pale banded . . . . . An. koreicus

II. FOURTH INSTAR LARVAE

1. Outer clypeal hairs splitting into many branchlets (35 to 60) forming fan-shaped tufts . . . 2
   Outer clypeal hairs splitting into much less numerous branchlets (less than 20) 3

2. Pecten without spines on teeth, long teeth darker brown than short ones; inner clypeal hairs proximate, long and single, dorsal surface of head usually showing four pigmented bands . . . . . An. sinensis
   Pecten with conspicuous spines on both long and short teeth extending to apex, long teeth darker than short ones; inner clypeal hair proximate, long and single, in some cases dichotomously branched toward the tip, dorsal surface of head usually showing three pigmented bands . . An. pullus

3. Outer clypeal hairs splitting into 11 to 15 branchlets; inner clypeal hairs proximate, long and single; antennal hair with 4 to 7 branches; pecten with conspicuous spines on short teeth, long teeth darker than short ones . . . . . An. sineroides
Outer clypeal hairs splitting into 4 to 6 branchlets 4

4. Prothoracic hair one branching near base; antennal hair short, branching near the middle; inner clypeal hairs, proximate, long and single; pecten with numerous fine spines on short teeth and rarely a few spines at base of long teeth, long teeth not darker than short ones . . . An. koreicus
Prothoracic hair one branching near apex; antennal hair long, branching near base; inner clypeal hairs and pecten teeth same as those of koreicus . . . . . An. edwardsi

B. Culicines.

The detailed distribution of the culicine mosquitoes in Korea is not well known. Ten species of Culex, eight species of Aedes and one species of Armigeres were reported from this country. The following is a general discussion of these species.

1. Culex sinensis Theobald, 1903. This is a medium-sized, brown mosquito and rare in Korea. The larvae breed in ponds, pools, or in stream beds. The females frequently invade houses during the night and vigorously attack man. This species has a low degree of suitability as an intermediate host of filaria.

2. Culex bitaeniorhynchus Giles, 1901. This is a large yellow-brown species. In Japanese literature it is often referred to as bitaeniorhynchus var. karatsuensis. The larvae breed in fresh and clean water with filamentous green algae. Adults attack man both during the night and in the daytime. Filarial larvae do not fully develop in this species.

3. Culex whitmorei (Giles) 1904. This is a small species, dark brown with whitish markings. The larvae breed in clear fresh water pools with sandy bottoms containing much decayed vegetable matter. The adults bite vigorously in the evening. This species is experimentally most suitable as the intermediate host of Wuchereria bancrofti.

4. Culex hayashii Yamada, 1917. This is a small dark species and is not known to attack man. The larvae breed in pools and slowly flowing streams. It has been recently collected from Seoul.

5. Culex vorax Edwards, 1921. This is a large brownish yellow mosquito with white markings. The larvae breed in artificial containers or ground pools and are predaceous to other mosquito larvae. The adults do not attack man under natural conditions.

6. Culex orientalis Edwards, 1921. This is a medium-sized species with spotted wings. The larvae have been collected from lotus ponds, springs, and lakes in China. The adults do not attack man.

7. Culex tritaeniorhynchus Giles, 1901. This is a small, dark reddish brown species. It is a common mosquito in Korea and attacks man at night. The larvae breed in various habitats such as ponds, pools, ditches, rice fields, etc. It was found to have a low degree of suitability as the intermediate host of Wuchereria bancrofti, but was reported to be infected with Japanese "B" encephalitis in laboratory as well as in nature.

8. Culex vishnui Theobald, 1901. This is a small brown species with a banded proboscis and was reported to be rarely seen in Korea. The larvae breed in ponds, pools, rice fields, etc. Adults attack during the night. Filarial larvae do not undergo full development in this species.

9. Culex pipiens pallens Coquillett, 1898. This is one of the most common domestic mosquitoes in Korea. It is a medium-sized, reddish brown species and is strongly anthropophilic, generally attacking at night. The larvae breed in almost any collection of water. This species is reported to be a most suitable host of Wuchereria bancrofti (Yamada, 1927) and both experimental and natural infection with Japanese "B" encephalitis was reported in this species.

10. Culex vagans Wiedemann, 1828. This is a medium-sized yellowish brown species with striped legs. It is only recently that it has been collected from Seoul. In the Japanese literature it is referred to as C. tipuliformis. The larvae breed in lakes, ponds, and pools with filamentous algae. Adults attack man during the night. This mosquito is reported as a suitable intermediate host of Wuchereria bancrofti (Yamada, 1927).

11. Aedes flavopictus Yamada, 1921. This is a small-sized species with banded tarsi and unbanded proboscis. It is very similar to the widely distributed albopictus, differing only in the yellow-tinted sublateral and lateral markings of the scutum and in the male genitalia. The larval habitat of this species is now known. The adults are active blood suckers but no information is available on its role in transmitting diseases.

12. Aedes vexans nipponii (Theobald) 1907. This is a dark brown, medium-sized species with pale yellowish markings. The larvae breed in rather temporary rain pools.

The adults bite both by day and by night. This species is not a suitable intermediate host of Wuchereria bancrofti according to Yamada (1927).

13. Aedes albolateralis (Theobald) 1908. This is a dark, medium-sized species with white markings. Both proboscis and tarsi are unbanded. The larvae breed in tree holes and bamboo stumps and the adults are daytime biters. According to Yamada (1927) Wuchereria bancrofti larvae only undergo partial development in this mosquito.

14. Aedes togoi (Theobald) 1907. This is a rather large, dark brown species with yellowish white markings. The larvae primarily breed in brackish rock pools just above high tide, but are also found in fresh or nearly fresh water in artificial containers near the coast. The adults are persistent biters and frequently invade houses during the day and lighted rooms at night. The species is reported to be a very suitable host of Wuchereria bancrofti (Yamada, 1927), and experimental infection with Japanese "B" encephalitis was obtained in this mosquito (Mitamura et al. 1939; Chagin and Kondrat'yev, 1943).

15. Aedes koreicus Edwards, 1917. This is a rather large species, dark brown, with gold yellow markings. Proboscis brown black, posterior tarsi with segments I to IV basally banded. This species overwinters in the egg stage. Eggs hatch when the weather becomes warm. Larvae breed commonly in household containers such as flower pots and barrels as well as in water pools. The adults bite during the day. Wuchereria bancrofti larvae do not fully develop in this mosquito (Yamada, 1927).

16. Aedes dorsalis (Meigen), 1830. This is a cosmopolitan species but it is rare in Korea. The larvae breed in ground pools and marshes. The adults are very anthropophilic and bite during the day. Wuchereria bancrofti larvae do not fully develop in this mosquito according to Yamada (1927).

17. Aedes seoulensis Yamada, 1921. This is a black and white medium-sized mosquito. The larvae breed in tree holes. Yamada (1921) reported that the adults bite during the day. Nothing is known of its role in disease transmission.

18. Aedes chemulpoensis Yamada, 1921. This is a small black species with snow white markings. It is also a tree hole breeder. The adults are vigorous daytime biters and filarial larvae do not fully develop in this species according to Yamada (1921).

19. Armigeres subalbatus (Coquillet), 1898. This is a large black species with unbanded proboscis and tarsi. It is widely distributed in the Oriental region and has been reported from southern Korea. This is a very domestic species and the larvae usually breed in very foul water and are predaceous on larvae of other mosquitoes. The adults are both anthropophilic and zoophilic and are persistent biters in the evening as well as in the shade during the day. Wuchereria bancrofti larvae do not fully develop in this species according to Yamada (1927).

KEY TO CULICINE MOSQUITOES IN KOREA

I. ADULTS

1. Tarsi with pale bands or marks 2
   Tarsi without pale bands or marks. 14

2. Proboscis with a pale median band. 9
   Proboscis without a definite pale median band . . 3

3. Palpus in female entirely dark. 4
   Palpus in female marked with white 5

4. Scutum with anterior portion clothed with white scales, hind tarsi with basal bands on I - IV and apical bands on I - II. . . . . Ae. seoulensis
   Scutum with yellowish linear markings; hind tarsi with only basal bands on I - IV . . . . . Ae. koreicus

5. Last hind tarsal all white 6
   Last hind tarsal not all white 8

6. Scutum with a silvery median stripe and some pale yellowish short lines; male genitalia with side piece nearly twice as long as broad; clasper with a long subterminal articulated spine. . . . . Ae. flavopictus
   Scutum with white markings but without median stripe 7

7. Scutum with a median small white spot at anterior margin, a small white spot at each anterolateral angle, a large semi-lunar white patch at each side, a medium-sized white spot in front of wing base, a pair of narrow sublateral white stripes on posterior half, and a small white spot in front of ante-scutellar space; tarsal bands basal; abdominal bands basal . . . . . Ae. chemulpoensis
   Scutum with a narrow brown central stripe and a broad brown continuous margin; with scaling speckled with dark scales; tarsal bands covering joints; abdominal tergites with both basal and apical bands . . . . . Ae. dorsalis

8. Tarsal bands covering joints; scutum with a linear pattern of whitish scales; proboscis entirely dark; abdominal tergites basally banded . . . Ae. togoi

Tarsal bands basal, not covering joints, scutum variegated but without definite lines; proboscis broadly light yellowish at middle; abdominal tergites with basal white band and a median white patch extending over apical half of each segment . . . . . Ae. vexans nipponii

9. Wing with numerous white scales 10
Wing scales all dark 11

10. Abdominal pale band apical; wing speckled equally with numerous pale and dark scales; anterior two-thirds of scutum with whitish scales in contrast with dark scales on the posterior third; femora and tibiae mottled but without conspicuous pale spots . . . . . C. bitaeniorhynchus

Abdominal pale band basal; wing with three whitish costal spots, the first extending over vein four; scutum with indistinct dark brownish linear markings; femora and tibiae with distinct apical pale spots . . . . . C. orientalis

11. Tarsal bands covering the joints 12
Tarsal bands basal; scutum scales whitish, with three anterior posts and two elongated posterior spots, dark brown; abdominal bands basal, much broadened medianly forming a large triangle . . . . . C. whitmorei

12. Anterior surface of mid-femur dark scaled; abdominal pale bands basal; scutal scales principally brownish 13

Anterior surface of mid-femur speckled with pale scales; abdominal pale bands apical; anterior two-thirds of scutum pale scaled with three dark brown spots, posterior third dark brown . . . . . C. sinensis

13. Vertex with upright forked scales all dark; scutal scales minute and coppery brown; proboscis with pale scales at base . . . . . C. tritaeniorhynchus

Vertex with upright forked scales dark at sides and white toward middle; scutal scales somewhat shaggy, mixed coppery brown and brownish yellow; proboscis without pale scales at base . . . . . C. vishnui

14. Abdominal tergites unbanded; proboscis and palpus entirely dark 15
Abdominal tergites pale banded 16

15. Abdominal tergites entirely dark; scutum dark reddish brown with antero-lateral portion paler; scutellum with all scales narrow; pleuron without patches of broad overlapping pale scales . . . . . C. hayashii

Abdominal tergites with lateral white patches; scutum coppery brown with a distinct pale yellowish margin; abdominal sternites with dark apical bands, hind femur white at apex on outer side; lower mesepimeral bristles absent . Ar. subalbatus

16. Scutellum with broad and appressed scales; abdominal bands on segments II to IV incomplete medianly; proboscis and palpus dark; scutum with a large anterior white spot which in female is divided into two spots . . . . Ae. albolateralis

Scutellum with all scales narrow; abdominal bands on segments II to IV complete and broadened medianly 17

17. Abdominal bands apical; with four or more lower mesepimeral bristles; outer surface of hind femur with pale and dark scales evenly mixed C. vorax

Abdominal bands basal; lower mesepimeral bristles less than four 18

18. Fore and mid-femora and all tibiae with a longitudinal stripe in front; scutal scales yellowish brown . . . . . C. vagans

Femora pale beneath, all femora and tibiae with apex white; scutal scales reddish brown . . . . . C. pipiens pallens

II. FOURTH INSTAR LARVAE*

1. Siphon with pecten and ventral-lateral hair tufts; antennae longer 2

Siphon short, without a pecten and ventral-lateral hair tufts; antennae short, with shaft bare except for one small hair at middle; comb teeth fringed with hairs on both sides; front hair A usually of three fairly long branches, B, C, and d placed far forward . . . . . Ar. subalbatus

2. Siphon with only one pair of ventral-lateral hair tufts . . . . . Gen. Aedes 3

Siphon with several pairs of ventral-lateral hair tufts . . . . . Gen. Culex 10

3. Comb in a single or partially double row 4

Comb in an irregular patch 7

4. Body without obvious stellate hairs 5

Body with numerous stellate hairs on both dorsal and ventral surface; comb of 6 to 10 laterally dentated teeth in a single row; siphon tube about three times as long as diameter at base; with a row of about 15 dentated teeth from base to middle; antennal hair simple; anal papillae long, about five times as long as anal plate . . . . . Ae. chemulpoensis

* Larva of C. orientalis has not been described.

5. Pecten teeth fairly regularly spaced; comb of 8 to 12 large teeth in a single row 6
One or more distal pecten teeth more widely spaced; comb of about 10 to 14 sharp-pointed teeth in one or two irregular rows; antennal hair with about 7 branches . . . . . Ae. vexans nipponii

6. Pecten of 7 to 14 small teeth; shaft of antenna smooth, with a single hair; siphon more than three times the length of diameter at base, tuft of 4 to 5 branches; antenna about eight times the length at greatest breadth; fig. 1h often three-branched . . . . . Ae. flavopictus
Pecten of 15 to 24 rather small teeth; shaft of antenna spinose, hair tuft with 6 to 7 branches; head hairs A, B, and d in a transverse row, C directly behind B, A with 6 to 8 branches, B with 4 to 10 branches, C with 5 to 11 branches and d with 7 to 10 branches; siphon 3 to 3½ times the length of diameter at base . . . . . Ae. albolateralis

7. Head hairs B and C both branched 8
Head hairs B and C both single; comb in a triangular patch of about 25 to 30 scales; pecten of evenly spaced teeth extending to near the middle, tuft multiple . . . . . Ae. dorsalis

8. Abdomen without stellate hairs 9
Abdomen with some stellate hairs; antennal hair single or branched into two from base, situated beyond the middle of shaft; head hairs all branched except e which is single and long, d about as large as A and B; siphon about three times the length of diameter at base, pecten of 20 to 22 laterally fringed teeth . . . Ae. seoulensis

9. Apical few pecten teeth much longer than those toward base of siphon; siphon tuft large; reaching far beyond apex of tube . . Ae. togoi
Apical few pecten not conspicuously longer than those toward base of siphon; siphon tuft not reaching beyond apex of tube . . . . Ae. koreicus

10. Comb in a patch of many teeth 11
Comb in a single or partially double row of not more than eight teeth 14

11. Pecten not extending more than half the length of tube; mouth brushes not prehensile 12
Pecten of 7 to 11 teeth, extending almost the entire length of tube, ventral tufts as long as tube, siphon 1.2 to 2.5 times the length of diameter at base; gills short; mouth brushes thickened and prehensile; comb of 35 to 45 fringed teeth; antenna short, shaft smooth with a single short hair at about a third from base . . . . . C. vorax

12. Head hairs B and C or at least B reaching beyond apex of head 13

Head hairs B and C short, not reaching beyond apex of head; antenna curved, with a large hair tuft at apical third of shaft; siphon slender, 5.5 times the length of diameter at base; pecten of 11 to 15 long teeth with lateral denticles . . . . . C. hayashii

13. Preclypeal spines stout, black and usually straight, siphon about eight times its basal diameter and usually with five pairs of hair tufts, hardly longer than median diameter of tube . . . . . C. tritaeniorhynchus

Preclypeal spines slender, pale and curved; siphon about five times its basal diameter and usually with four pairs of hair tufts, much longer than median diameter of tube . . . . . C. pipiens pallens

. . . . . C. vagans

14. Antennal tuft inserted at or before middle of shaft; siphon six to eight times the length of diameter at base and with four pairs of small hair tufts 15

Antennal tuft inserted beyond middle of shaft; siphon four to six times the length of diameter at base and with more than four pairs of hair tufts 16

15. Subapical antennal bristles inserted close to apical ones; mentum bordered with a large number of minute teeth; comb of five to six large sharp teeth irregularly arranged; pecten of three to six small indistinct transparent teeth . . . . . C. bitaeniorhynchus

Subapical antennal bristles placed nearly half way between apex of antenna and shaft; mentum with some large teeth toward apex; comb of four to six large sharp teeth arranged more or less in a row; pecten of two to four very small teeth placed close together . . . C. sinensis

16. Siphon with six to seven pairs of rather small tufted hairs along posterior border and two small pairs of lateral hairs of two to three branches; anal papillae not pointed; dorsal pair a little longer than ventral pair; head comparatively large; head hair A conspicuously dark . . . . . C. vishnui

Siphon with five to six pairs of two-branched, fairly long, subplumose hairs along posterior border and two pairs of lateral two-branched shorter hairs; both pairs of anal papillae pointed and of same length . . . . . C. whitmorei

2. BITING MIDGES (HELEIDAE (CERATOPOGONIDAE))

This family contains the small and delicate blood sucking gnats. A few genera are known to be noxious to man. Only a few species of Culicoides have been reported to transmit filaria which are nonpathogenic to man. In Japan, as well as in Manchuria, this family is represented by a number of species, but in Korea only two species, Culicoides miharai Kinoshida and C. sugimotonis Shiraki, have been reported.

C. miharai is very common in southern Korea, especially around the region of Mokp'o (Fujito, 1938, 1939). It is densely inhabited in the littoral zones of the southern coast of the country where, during certain periods of the year, it appears in great numbers and attacks man and his animals, causing considerable damage. Its troublesome nature and habits have become legendary among the inhabitants. The fly population begins to increase in the latter part of April and first part of May, and reaches its climax in the middle of June. A second swarming begins during the latter part of July, reaches its maximum between the latter part of August and the first part of October, and ends approximately the first of November. The flies are most active in the evening. They prefer to attack the parts of the body where sweat is prominent or the portion thickly covered with hairs. The affected parts invariably become very itchy for several days. Travelers usually suffer mostly from these insects.

C. sugimotonis (C. arakawae Matsumura) is a common species in Japan and is listed as occurring in Korea by Tokunaga (1943). It attacks fowl principally. It is attracted by light into houses where it will also attack man.

A nonbiting species, Forcipomyia breviforceps was described from Mokp'o by Tokunaga, 1940.

3. HORSE FLIES (TABANIDAE)

Tabanid flies are well-known pests of horses, cattle, and other animals and often are extremely annoying to man. In addition, they may play an important role as carriers of certain diseases, such as tularemia, anthrax, and loa loa in man, and trypanosomiasis in horses and cattle. The flies are numerous and widespread in Korea. Twenty-two species have been reported from this country (Okamoto, 1924; Shiraki, 1932; Olsoufiev, 1937; Kono and Takahasi, 1939), viz.:

SPECIES	LOCALITY
Chrysops (Chrysops) dissectus Loew	Kangnŭng
Chrysops (Chrysops) suavis Loew	Wŏnsan, Cheju-Do
Chrysops (Chrysops) validus Loew	Korea
Tabanus (Tylostypia) astur Erickson	Korea
Tabanus (Tylostypia) confinis Zetterstedt	Maengsan
Tabanus (Tylostypia) brevis Loew	Maengsan
Tabanus (Tylostypia) stigmopterus Olsoufiev	Korea
Tabanus (Tabanus) amoenus Walker	Suwŏn, Chaeryŏng, Kangnŭng
Tabanus (Tabanus) budda Portschinsky	P'yŏngyang, Kyŏngsŏng
Tabanus (Tabanus) chrysurus Loew	Changja-San, Cheju-Do
Tabanus (Tabanus) coreanus Shiraki	Chaeryŏng, Myobang-San, Sogwang-Sa, Sobaek-San, Suwŏn
Tabanus (Tabanus) galloisi Kôno and Takahasi	Suwŏn
Tabanus (Tabanus) griseus griseus Krober	Chaeryŏng, Suwŏn, Ka-San
Tabanus (Tabanus) griseus pallidiventris Olsoufiev	Korea
Tabanus (Tabanus) mandarinus Schiner	Seoul, Suwŏn, Cheju-Do
Tabanus (Tabanus) yao Macquart	Seoul, Suwŏn, Chaeryŏng
Chrysozona antennata Shiraki	Changja-San, Chaeryŏng, Suwŏn
Chrysozona koryoensis Shiraki	Korea
Chrysozona nana Olsoufiev	Korea
Chrysozona peculiaris Kôno and Takahasi	Suwŏn
Chrysozona tamerlandi Szilady	Korea
Chrysozona tristis Bigot	Cheju-Do

Although the females of all species will attack man and in taking a blood meal produce an ugly painful wound, which heals with difficulty, there is no report of disease transmission by these flies in Korea.

4. MUSCOID FLIES

Muscoid flies in Korea are numerous both in actual numbers and in number of species. This group of flies includes the house-frequenting species. With the exception of the genus Glossina which is known to be the vector of African sleeping sickness, these flies do not serve as hosts of human parasites. However, many species serve as mechanical carriers of such diseases as dysentery, typhoid fever, cholera, etc., and in many species the larvae may be tissue parasites of man, producing myiasis. The important house-frequenting species in Korea are: Musca domestica, Muscina stabulans, Fannia canicularis, F. scalaris, Stomoxys calcitrans, Calliphora lata, C. erythrocephala, Scatophaga stercolaria, Sarcophaga carnaria, S. irrequiata, Ophyra nigra, Lucilia sericata, and Sepsis sp. (Kobayashi, 1927). Musca domestica is the most abundant house-frequenting species in Korea. Muscina stabulans, Fannia canicularis, F. scarlaris, Lucilia sericata, Sarcophaga irrequiata and Ophyra nigra are also common.

The most prevalent season was from late spring to early summer, and again in autumn. The population showed a remarkable decrease in mid-summer when the weather is wet. Most of the species overwinter in the adult stage and swarms of flies occur even during the winter months in many parts of the country. This is probably due to the method of the heating system practiced by the Koreans. Hot and dry air in the houses during the winter months favors the overwintering of adult flies and results in their early prevalence in the spring. Musca domestica, Muscina stabulans, Mesembrina sp., Scatophaga stercolaria and several species of Anthomyid overwinter in the adult stage. Calliphora lata overwinters in the adult stage and is able to continue breeding in the winter. Fannia canicularis and F. scalaris seem to overwinter both in the adult and pupal stages. Species of Lucilia and Sarcophaga and Stomoxys calcitrans overwinter in the pupal stage, and Ophyra nigra in both pupal and larval stages (Kobayashi, 1922).

5. FLEAS (SIPHONAPTERA)

Fleas are wingless insects which live as ectoparasites on mammals and birds. In general, different species of

fleas are fairly closely confined to their particular hosts, but many species will readily attack others when their normal hosts are not available. The fleas of medical interest are those which are commonly found on rats and other rodents which are subject to plague and murine typhus and those which may attack man. Nagahana (1937-38) made an extensive survey of ratfleas in Korea from April to October 1936. From 3,753 rats collected from 19 localities all over Korea, 29,328 fleas belonging to 11 species were discovered. Xenopsylla cheopis and Monopsyllus anisus (Ceratophyllus) were most numerous and widespread.

The following records show the fleas collected on rats by Nagahana:

Xenopsylla cheopis (Rothschild), 1903. This is a cosmopolitan species and most common and widespread in Korea. It is especially common in the northern part of the country. Nearly 50 per cent of the specimens collected by Nagahana from all over Korea belong to this species. Nearly 60 per cent of those collected from the Port of Pusan and over 80 per cent of those collected from Sinŭiju belonged to this species. This species is also known to be the most common transmitter of bubonic plague and murine typhus. In Korea the species is found throughout the year but most numerous in August and September. The population decreases abruptly in October and remains low until June when it greatly increases. This species has been collected from the following localities: Chinnamp'o, Ch'ŏngjin, Chŏngju, Ch'ŏrwŏn, Hamhŭng, Inch'ŏn, Kwangju, Kunsan, Kyŏngsŏng, Mokp'o, Pusan, P'yŏngyang, Sariwŏn, Sinŭiju, Sŏngjin, Taejŏn, Unp'yŏngmyŏn, Wŏnsan, and Yŏsu.

Monopsylla anisus (Rothschild), 1908. This is also a very common species and is widespread in Korea. About 38 per cent of the fleas collected by Nagahana were M. anisus. This species is also capable of transmitting plague. This species is most prevalent in the latter part of spring and the population begins to decrease in summer when the number of X. cheopis begins to increase. This species has been collected from the following localities: Chinnamp'o, Ch'ŏngjin, Chŏnju, Ch'ŏrwŏn, Hamhŭng, Inch'ŏn, Kwanju, Kunsan, Kyŏngsŏng, Mokp'o, Pusan, P'yŏngyang, Sariwŏn, Sinŭiju, Sŏngjin, Taejŏn, Unp'yŏngmyŏn, Wŏnsan, and Yŏsu.

Leptopsylla musculi (Dugès), 1832. This is the third common species of rat-fleas in Korea but it is much less numerous than the two preceding species, representing less than 11 per cent of Nagahana's collection. It is more common in southern Korea than in north Korea. The species is also collected throughout the year but is more prevalent in May and October. It has been collected from the following locali-

ties: Chinnamp'o, Chŏnju, Inch'ŏn, Kunsan, Kyŏngsŏng, Mokp'o, Pusan, P'yŏngyang, Sariwŏn, Sinŭiju, Sŏngjin, Taejŏn, Unp'yŏngmyŏn, and Yŏsu.

Nosopsyllus fasciatus Bosc, 1801 (Ceratophyllus). This is an uncommon species in Korea. It is found at the seaports of the east, south, and southern part of the west coast and is more numerous in May. It has been collected from Ch'ŏngjin, Kunsan, Mokp'o, Pusan, Sŏngjin, Wŏnsan, and Yŏsu.

Ceratophyllus curvispinus Miyajima and Koidzumi, 1909. This is a rare species collected on rats. It has been collected from the Port of Pusan, Kyŏngsŏng, and Unp'yŏngmyŏn.

Ctenocephalides canis (Curtis), 1826. The dog flea is probably common and widespread in Korea but they are rarely collected from rats. Nagahana reported it on rats from Hamhŭng, Kyŏngsŏng, Pusan, and Sinŭiju.

Pulex irritans Linnaeus, 1758. The human flea is probably also common in Korea, but has been collected on rats only from Kyŏngsŏng, Sariwŏn, and Sinŭiju.

In addition to the species discussed above, Nagahana also collected two species of Ctenophthalmus (one of which was provisionally determined as Ct. agyrtes), one species of Rhadinopsylla (from Sinŭiju), and one species of Hystrichopsylla which was suspected to be H. tripectinata (from Kyŏngsŏng). Ct. agyrtes (?) was collected from Ch'ŏrwŏn, Hamhŭng, Inch'ŏn, Kyŏngsŏng, Sariwŏn, and Unp'yŏngmyŏn and the other species of Ctenophthalmus from Sinŭiju. A number of Neopsylla bidentatiformis Wagner and a species of Ischinopsyllus were collected from Sinŭiju. Two specimens of Stenoponia sp. were collected from Unp'yŏngmyŏn on the outskirts of Kyŏngsŏng.

6. LICE (ANOPLURA)

Body louse, Pediculus humanus corporis, is widespread in Korea, especially among the poor people. Its role in the transmission of epidemic typhus and relapsing fever is well known. The head louse, P. humanus capitus, and the crab louse, Phthirius pubis have also been found in Korea (Doi, 1932) and are probably widespread.

7. BEDBUGS (CIMICIDAE)

Bedbugs are the best known human biters of all the true bugs (Hemiptera) throughout the world. They ordinarily

attack man in the dark and hide themselves in crevices of walls and beds and seams of bedding in the daytime. Usually the bite produces a small, hard swelling or may even be accompanied by an edema and a disagreeable inflammation, causing restlessness and loss of sleep to the victims. However the effect of the bite depends greatly on the susceptibility of the individuals attacked. Some persons are so little affected that they may be wholly ignorant of the presence of even a large number of bugs. The role of bedbugs in the transmission of diseases to man is still uncertain. There is experimental evidence to show that they are capable of transmitting a number of diseases, such as, relapsing fever, kala azar, plague, and tularemia, but there is no convincing evidence that they are the natural vectors of the disease producing agents although they may serve as mechanical carriers.

It is interesting to note that both the common bedbug, Cimex lectularius, and the tropical bedbug, C. hemipterus, are widespread in Korea. The presence of the latter species is probably due to the heating methods practiced in the houses. Nagahana (1934) reported the collection of the two species from the following localities:

Cimex lecturarius:

Kyŏngsang-namdo:	Ch'angwŏn, Changnyŏng, Chinju, Hadong, Haman, Hyŏpch'ŏn, Kŏch'ang, Kosŏng, Kŭmhae, Masan, Miryang, Namhae, Pusan, Sach'ŏn, Tongnae, Tongyŏng, Uiryŏng, Ulsan, and Yangsan.
Kyŏngsang-pukto:	Andong, Chilgok, Ch'ŏngson, Kŭmch'ŏn, Kyŏngju, Kyŏngsan, P'ohang, Sangju, Sŏnsan, Taegu, Talsŏng, Uisŏng, Yŏngch'ŏn, Yŏngju, and Yŏngyang.
Chŏlla-namdo:	Changhŭng, Cheju, Haenam, Hamp'yŏng, Kangjin, Kohŭng, Kurye, Kwangju, Mokp'o, Muan, Naju, Posŏng, Tangyang, Yŏngam, and Yŏnggwang.
Chŏlla-pukto:	Changsu, Chŏngŭp, Chŏnju, Iksan, Koch'ang, Kŭmsan, Kunsan, Muju, Puan, and Sunch'ang.

Cimex hemipterus:

Ch'ungch'ong-namdo:	Asan, Ch'ŏnan, Hongsŏng, Kongju, Nonsan, Poryŏng, Puyo, Sŏch'ŏn, Taejŏn, and Tangjin.
Ch'ungch'ong-pukto:	Chech'ŏn, Chinch'on, Koesan, Okch'ŏn, Poŭn, and Yŏngdong.
Kyŏnggi-do:	Ich'ŏn, Inch'ŏn, Kaesŏng, Kanghwa, Koyang, Kŭmp'o, Kyŏngsŏng, P'aju, Sihŭng, Suwŏn, Yangju, and Yŏju.
Kangwŏn-do:	Ch'ŏrwŏn, Ch'unch'on, Hoengsŏng, Hoeyang, Hwach'on, Kosŏng, P'yŏnggang, Ulchin and Yanggu.
Hwanghae-do:	Chaeryŏng, Changyŏn, Haeju, Hwangju, Pongsan, Sŏhŭng, Songhwa, Ullyul, and Yŏnan.
P'yŏngan-namdo:	Anju, Chinnamp'o, Chunghwa, Kaech'ŏn, Kangdong, Kangsŏ, Maengsan, P'yŏngyang, Pyŏngwŏn, Taedong, (Daido), Yangdŏk, and Yŏngwon.
P'yŏngan-pukto:	Ch'angsŏng, Ch'osan, Chŏngju, Huch'ang, Huich'ŏn, Kanggye, Pakch'ŏn, Uiju, Unsan, and Wiwŏn.
Hamgyŏng-namdo:	Anbyŏn, Changjin, Chŏngp'yong, Hamhŭng, Hongwŏn, Kapsan, Puckch'ŏng, Pungsan, and Tanch'on.
Hamgyŏng-pukto:	Ch'ongjin, Chongsŏng, Kilchu, Kyŏnghŭng, Kyŏngsŏng, Kyŏngwŏn, and Puryŏng.
Kyŏngsang-namdo:	Ch'angwŏn, Hadong, Haman, Hamyang, Hyŏpch'ŏn, Koch'ang, Kosŏng, Kŭmhae, Miryang, Sach'ŏn, Tongnae, Ŭiryŏng, Ulsan, and Yangsan.
Kyŏngsang-pukto:	Andong, Chilgok, Ch'ŏngdo, Kŭmch'ŏn, Kyŏngju, Mun'gyŏng, Sangju, Sŏnsan, Uisŏng, Yŏng'il, Yongch'ŏn, and Yŏngyang.
Chŏlla-namdo:	Changhŭng, Haenam, Kangjin, Kohŭng, Kurye, Mokp'o, Muan, Naju, Posŏng, Tanyang, and Yŏnggwang.
Chŏlla-pukto:	Changsu, Chŏnju, Iksan, Koch'ang, Muju, Puan, and Sunch'ang.
Ch'ungch'ong-namdo:	Asan, Ch'ŏnan, Ch'ŏngyang, Kongju, Nonsan, Poryŏng, Puyo, Sŏch'ŏn, Sŏsan, Taejŏn, and Tangjin.
Ch'ungch'ong-pukto:	Chech'ŏn, Chinch'ŏn, Ch'ŏngju, Ch'ungju, Koesan, Okch'ŏn, Poŭn, and Yŏngdong.

Cimex hemipterus:

Kyŏnggi-do:	Ich'ŏn, Kŭmp'o, P'aju, Sihŭng, Suwŏn, Yangju, and Yŏju.
Kangwŏn-do:	Chŏngsŏn, Ich'ŏn, Inje, Hoengsŏng, Hoeyang, Kosŏng, Kŭmhwa, P'yongch'ang, P'yŏnggang, Ulchin, and Yanggu.
Hwanghae-do:	Changyŏn, Chaeryŏng, Hwangju, Sŏhŭng, Songhwa, Suan, Yŏnan, and Ullyul.
P'yŏngan-namdo:	Anju, Chinnamp'o, Chunghwa, Kaech'ŏn, Kangdong, Kangsŏ, Maengsan, Pyŏngwŏn, Sŏngch'ŏn, Taedong (Daido), Tŏkch'ŏn, and Yŏngwŏn.
P'yŏngan-pukto:	Ch'angsŏng, Chasŏng, Chŏngju, Ch'osan, Huch'ang, Hŭich'ŏn, Kanggye, Pakch'ŏn, Sŏnch'ŏn, Uiju, and Unsan.
Hamgyŏng-namdo:	Anbyŏn, Changjin, Chŏngp'yong, Hamhŭng, Hongwŏn, Kapsan, Mumch'ŏn, Pukch'ŏng, P'ungsan, and Tanch'on.
Hamgyŏng-pukto:	Chongsŏng, Kilchu, Kyŏnghŭng, Kyŏngsŏng, Kyŏngwŏn, and Puryŏng.

These two species can be separated as follows:

Body brown; lateral margin of prothorax conspicuously explanate anteriorly; hairs on prothorax retrorse. C. lectularis

Body dark brown, lateral margin of prothorax not explanate, hairs of prothorax erect. . . . . C. hemipterus

8. POISONOUS MOTHS (LEPIDOPTERA)

Many species of moths, in addition to the damage they do to crops and vegetables, are injurious to man and his animals by their poisonous hairs. The larvae, pupae, or adults of these species are covered with numerous hairs or setae connected with poisonous glands. These hairs or setae, when in contact with the human body, cause severe pain and inflammation which lasts from several hours to several weeks, depending on the various species of the moths and the individual susceptibility.

A number of poisonous species are found in Korea. These include: Parasa sinica Moore, P. consocia Walker, Marosoideus flavidorsalis Staudinger, Microleon longipalpis Butler, Dendrolimus spectobilis Butler, D. undans excellense Butler, Gastropacha quercifolia Linn., Nygmia subflava Bremer and Arctornis xanthocampa Dyar. Among these, Nygmia subflava (Euproctis flava Bremer) is reported to cause the greatest damage in Korea as well as in Japan.

The moth often occurs in great numbers in early summer to early fall. Heavy damages, caused by the poisonous hairs of this species to man and domestic animals, were reported in Hamgyŏng-pukto in 1930, in Hwanghae-do in 1935, and Kyŏnggi and Hwanghae-do in 1936 (Okinomi, 1936; Ueda, 1938; Tokunaga, 1943). The moth is about 12 to 16 mm. long with wing expanse of 30 to 45 mm. The male is smaller and slenderer than the female. Except for the margin of the wings, its whole body is covered with beautiful yellow powder which is composed of scales, hairs, and setae. This powder when in contact with the human body causes extreme itching and results in urticarial dermatitis, which often lasts two to three weeks. The moth has wide distribution and is found on the Japanese main island, Manchuria, and Siberia.

9. TICKS, MITES AND SCORPIONS (ARACHNIDA)

A. Ticks (Ixodoidea)

Although ticks have been proved to be carriers of several diseases of man and animals, at the present time there is no available information concerning their medical importance in Korea. Tick-borne encephalitis occurs throughout the wooded areas of the Maritime Krais of U.S.S.R. which borders Korea at her northeast corner. "Haemorrhagic fever" which is suspected to be transmitted by ticks is reported in Manchuria. These diseases, as well as their tick vectors, may easily be introduced into Korea if they have not already been brought into the country. Ticks also serve as vectors of relapsing fever, tick-borne typhus, tularemia, etc.

Eight species of ticks have been reported from Korea, as follows:

Argas vespertilionis (Latreille) is reported from Korea by Kishida (1933). This tick occasionally attacks man in Africa.

Boophilus decoloratus Koch is called the "blue tick" and is found in South Africa, transmitting the cattle diseases, redwater (braxy) and gallsickness (anaplasmosis). It also transmits spirillosis affecting horses, cattle, and sheep. Isshiki (1934) found it on cattle along the coastal region of southern Korea.

Boophilus (Palpoboophilus) minningi Kishida. Kishida described this tick on cattle in Korea, in 1936, but detailed information regarding this species is not available.

Dermacentor albopictus (Packard) (= D. variegatus Marx and Neumann) is a one-host tick. The larvae and nymphs feed on the same large animals as the adults and do not drop for ecdysis. It can carry spotted fever experimentally but probably does not do so under natural conditions. Isshiki (1934) also reported this tick on cattle in Hamgyongpukto of north Korea.

Haemaphysalis bispinosa Neumann is widely distributed from India to Siberia (Vladivostok) with a very wide host range, including man. It is found throughout Korea.

Haemaphysalis concinna Koch is also a widespread species and is distributed throughout Europe and East Asia. Its hosts include sheep, deer, hedgehogs, dogs, cattle, and horses. It is found in the northern part of Korea.

Ixodes acuminatus Neumann is a European species and has been collected on rats. Isshiki (1934) found it on cattle in central Korea.

Ixodes ricinus (Linn.) is a cosmopolitan species and has no host specificity. It is found on all mammals as well as on many birds. Its bite causes tick paralysis and it is also incriminated in the transmission of piroplasmosis of cattle and dogs in various regions. This species is found in the northern part of Korea.

Haemaphysalis flava Neumann and Rhipicephalus sanguineus (Latreille) were also reported in Korea, but the source of information cannot be verified. However, as these are both widespread species and both are found in the neighboring areas, their occurrence in Korea is to be expected. R. sanguineus is the common dog tick which has an extensive host range, and is found wherever man lives with dogs. It is a vector of anaplasmosis and also causes tick paralysis. Haemaphysalis flava is widely distributed in Japan, Formosa, India, and Ceylon and has a wide host range. It is reported to be the vector of tularemia among wild hares in Japan.

B. Mites.

Although there are no available reports on mites in Korea, these small parasites are undoubtedly present in this country. Saito (1930) reported a species of Liponyssus, probably L. bacoti, which is parasitic on rat and attacks man in Korea. The bites of this mite were reported to cause 39.5° to 40° C. fever in 2 days and in some cases caused cramps and cyanosis (?) during the second day. A certain amount of extract from the mite injected in a marmot will produce fever in the animal. The mite is widespread in this country. Trombicula akamushi which transmits scrub typhus in Japan may also occur in Korea.

C. Scorpions.

A very poisonous species of scorpion, Ruthus martinsi Karsch, is found in Korea. This scorpion is dark green on the dorsal side and yellowish on the ventral, attaining a length of about 60 mm. It often invades houses during the summer. Its sting is very painful, causing fever and sometimes death. This species is commonly found in Hwanghaedo, P'yŏngan-namdo, P'yŏngan-pukto, Hamgyŏng-namdo, and Hamgyŏng-pukto (Machida and Aoyama, 1928). The scorpion is also present in Manchuria, China, and Formosa (Kishida, 1933).

Chapter XI. OTHER ANIMALS OF MEDICAL IMPORTANCE

1. MOLLUSCA AND CRUSTACEA

A. Mollusca.

Snails of various species are medically important since they are obligatory intermediate hosts of several parasitic flukes infecting man. Paragonimus westermani, one of the most important human parasites in Korea, cannot complete its life cycle without the presence of certain species of Thiaridae (Melanidae) snails. These snails are found throughout Korea with the exception of the northern part of Ham-gyŏng-namdo and Hamgyŏng-pukto (Miyanaga, 1938).

Von Martens recorded fifteen species and three subspecies of these snails from Korea, but Miyanaga (1938) reclassified them as follows:

I. Cancellata group

1. Semisulcospira gottschei (v. Martens)

   Syn. nodiperda (v. Martens)
   nodiperda connectens (v. Martens).

2. Semisulcospira coreana (v. Martens)

   Syn. graniperda (v. Martens)
   multisculpta (v. Martens)
   succincta (v. Martens)
   nodiperda quinaris (v. Martens)
   multicincta (v. Martens)

3. Semisulcospira forticosta (v. Martens)

   Syn. tegulata (v. Martens)
   extensa (v. Martens)

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4. Semisulcospira paucicincta (v.Martens)

5. Semisulcospira nodifila (v. Martens)

Syn. ovulum (v. Martens)
globus (v. Martens)

II. Libertina group

6. Semisulcospira libertina (Gould)

S. gottschei and S. nodifila are found in central and western Korea and the mountainous regions of Kangwŏn-do; S. coreana in central Korea and Chŏlla-do; S. forticosta in southern and central Korea and along the western coastal region; S. libertina in the southern coastal areas; and S. paucicincta along the valley of Yalu River (Miyanaga, 1938).

By experimental examination S. libertina, forticosta, paucicincta, and gottschei are found to be intermediate hosts of Paragonimus westermani, and their distribution coincides with that of paragonimiasis in Korea (Kobayashi, 1928). Some species of tiarid snails have also been reported as an intermediate host of the liver fluke, Clonorchis sinensis, from other parts of the world (tuberculata in the Tonkin Delta, cancellata in China). S. libertina also serves as the first intermediate host of Metagonimus yokogawai.

Various species of the genus Lymnaea serve as intermediate host of Clonorchis sinensis. In Korea three species have been reported, viz., L. pervia, L. coreana, and L. ovata. Bulimus striatulus japonicus which also serves as the first intermediate host of C. sinensis is present in various parts of Korea wherever fluke patients are found (Kobayashi, 1924). Another species of Bulimus, B. kiusiuensis Hirase, is found in Korea but its role as intermediate host of the liver fluke is not ascertained (Shiba, 1933).

B. Crustacea.

Certain species of crayfishes and crabs serve as the second intermediate host of the lung-fluke, Paragonimus westermani. In Korea, the crayfishes, Cambaroides similis (Koebel) and C. dauricus, were found with encysted larvae of the fluke where tiarid snails were present. Generally, the crayfish prefers springs or narrow clear streams while the snails inhabit in slowly moving water with much vegetation at the bottom. Oftentimes they are both found in the same place, and then the crayfish is also infested with the cysts of the fluke.

Cambaroides dauricus is found in northern Korea, including the North and South Hamgyŏng Provinces, and the northern part of P'yŏngan-pukto, whereas C. similis is found in the rest of the country.

Kobayashi (1918) showed the following infection rate with the lung fluke in the crayfish collected from various localities in Korea:

TABLE 15. LUNG FLUKE INFECTION RATE IN CRAYFISH FROM VARIOUS LOCALITIES IN KOREA.

Locality	Crayfish examined	Infested crayfish	Percent
Kyŏnggi-do Province:			
Kanghwa-Gun, Soung-yang-i , I ..	350	308	88.0
Kanghwa-Gun, Soung-hyang-i, II..	247	56	22.7
Kanghwa-Gun, Kuk-wha-i, I	18	0	0
Kanghwa-Gun, Kuk-wha-i, II	6	2	33.3
Kanghwa-Gun, Hato-ri	17	0	0
Changdan-Gun, I	92	0	0
Changdan-Gun, II	6	1	16.7
Changdan-Gun, III.....	5	1	20.0
Sihung-Gun, I	24	0	0
Sihung-Gun, II.....	24	4	16.7
Suwŏn-Gun, Wi-wang-i	43	0	0
Chŏlla-pukto Province:			
Puan-Gun, Kai-am-tong.....	38	13	34.2
Puan-Gun, Chan-sou-tong	18	0	0
Puan-Gun, Myo-am-i	37	23	62.2
Puan-Gun, Pong-oun-tong	20	1	5.0

Since the Romanization used by Kobayashi is neither Japanese nor Korean, the places cannot be definitely located.

The crabs, Sesarma dehaani and Eriocheir japonicus are also found infested with the cysts of the fluke in Korea (Kobayashi, 1933). E. japonicus inhabits all waters near the sea (rice fields, ponds, streams, etc.). Since the snails usually occur in streams, the stream crabs are found to be much more infested. The crabs hatch in the spring, migrate upstream in March and April and downstream in the late summer and fall, where they are caught for human consumption (Kobayashi, 1928).

In Sesarma dehaani the encysted metacercariae were mostly found in the liver while in Eriocheir japonicus they were present primarily in the gills, muscles, and hypodermis.

Moriyasu (Kobayashi, 1918) examined 1,005 Eriocheir japonicus captured from Kanghwa County, Kyonggi-do and found 179 (or 29.2 per cent) infected with fluke. Kobayashi (1918) examined 101 crabs from the same area and found 13 infested. In some localities the infection rate is as high as 64.3 per cent.

2. FISHES

Certain species of fresh-water fishes serve as the second intermediate host of the liver fluke, Clonorchis sinensis, and the Yokogawa's fluke, Metagonimus yokogawai, both of which are endemic in Korea. The following species of cyprinoid fishes have been found to be infected by the encysted larvae of Clonorchis sinensis (Kobayashi, 1924, 1928):

Pseudorasbora parva

Locality: Dok-do, Yŏngdŭngp'o, Kyŏnggi-do, Nonsan, and Ch'ungch'ŏng-namdo.

Sarcocheilichthys morii

Locality: Hamp'yŏng, Chŏlla-namdo

Sarcocheilichthys kobayashii

Locality: Korea

Acanthorhodeus gracilis

Locality: Hamp'yŏng

Abbottina psegma

Locality: Hamp'yŏng

Leucogobio striatus

Locality: Yŏngdŭngp'o

Paraplecus eigenmanni

Locality: I-ri

Leucogobio sp.

Locality: I-ri

Poisonous and venomous fish are not of particular importance in Korea although a few species are found in Korean waters.

3. POISONOUS SNAKES

Poisonous snakes, which are a hazard in tropical and subtropical regions, are of little medical importance in Korea. Maki (1931) listed 12 species and subspecies of snakes from Korea, viz.: Natrix vibakari ruthveni, N. tigrina lateralis, Zamenis spinalis, Elaphe rufodorsata, Elaphe taeniura, Elaphe schrenckii, Elaphe dione, Dinodon rufozoratum, Pelamydrus platurus, Vipera berus sachalinensis, Agkistrodon halys brevicaudus, and Agkistrodon halys intermedius. Only the last four are poisonous.

Pelamydrus platurus is a sea snake. It is widely distributed in tropical waters and is found as far north as in Possiet Bay near the Korean boundary. The snake is about 700 to 900 mm. long and is extremely variable in color. There is usually a black vertebral stripe, sinuous in outline or broken up posteriorly into spots. The sides and belly are yellow.

The viper, Vipera berus sachalinensis, has a total length of about 600 mm., very rarely exceeds 700 mm. It is tawny-olive, with a brownish black, very distinct zigzag band along the middle of its back and tail, and a series of obscure alternating lateral spots. The top of the head is brownish black, chin and throat yellowish, mottled with dark slate color; whole underside uniformly slate black and each ventral narrowly edged with pale olive. This subspecies has been recorded from Saghalien, Siberia, and Korea while the typical species is widely distributed from western Europe to eastern China.

The pit viper, Agkistrodon halys (= A. blomhoffii), is a rather short and thick snake less than 2 feet long and is light gray with a series of large, more or less alternating darker

gray blotches extending either side of the dorsum. The head is light gray above and darker on the side with a conspicuous narrow light stripe. The belly is gray and very densely mottled with blackish gray. The disposition of this snake varies with the individuals. Some can hardly be induced to fight while others are reported to be extremely savage. It has been observed that when disturbed it vibrates the tail and flattens the body. Its venom is hemotoxic. The pit viper is widely distributed in northern China, Manchuria, Japan, and Korea. According to Maki (1931), the species is "very common in Korea from north to south". Some authors divided this species into several subspecies of which A. halys brevicaudus and A. halys intermedius are reported from Korea (Maki, 1931).

4. MAMMALS

Rats are of medical importance as reservoirs of plague and murine typhus. Several species of the genus Rattus have been reported from Korea. Nakamura and Kobayashi (1935) reported that from October 1933 to January 1935, 1,251 house rats were captured from Seoul. Of these, 1,113 were R. norvegicus norvegicus (= R. norvegicus hibernicus), 123 were R. rattus alexandrinus, and 15 were R. rattus rattus. One hundred and ten were collected from Inch'ŏn and all were R. norvegicus norvegicus.

In 1937 Nagahana (1937) reported 5,059 rats collected from all over Korea, the majority of which were Rattus norvegicus norvegicus. R. rattus alexandrinus were also collected. The Norvegian rat has a wide distribution in this country whereas alexandrinus was found only in the southern part of the peninsula. The distribution of this collection is shown in table 16. It is noted that no R. rattus rattus was collected in this series.

Dogs and cats and many other animals serve as reservoir hosts of Clonorchis sinensis in the endemic areas of clonorchiasis. Kobayashi (1924) found approximately 150 specimens of the liver fluke in a kolinsky, Lutreola sibiricus, captured near Seoul, indicating a new host of the fluke naturally infected.

TABLE 16. DISTRIBUTION OF RATS COLLECTED BY NAGAHANA IN KOREA IN 1937.

Locality	Total	Rattus norvegicus norvegicus (=R. n. hibernicus)	Rattus rattus alexandrinus
Kyŏngsŏn	3,827	3,827	0
Unp'yŏngmyŏn..	136	136	0
Inch'ŏn.....	201	188	13
Taejŏn	20	19	1
Kwangju.....	30	27	3
Kunsan.....	32	16	16
Mokp'o.....	37	16	21
Yŏsu	51	46	5
Pusan.....	203	177	26
Sariwŏn.....	78	78	0
P'yŏngyang.....	64	64	0
Chinnamp'o	56	56	0
Chŏngju	8	8	0
Sinŭiju	67	67	0
Ch'ŏrwŏn	32	32	0
Wŏnsan	47	47	0
Hamhŭng	73	73	0
Sŏngjin.....	37	37	0
Ch'ŏngjin.....	60	60	0
Total	5,059	4,974	85

BIBLIOGRAPHY

ANONYMOUS, 1920-1940. Nippon Teikoku Tokei Nenkan (Statistical yearbook of the Japanese Empire).

_____, 1936. Chosen Sōtokufu Shisei Nempo, (Annual report of the administration of the Government-General of Korea) (for 1934). (In Japanese).

_____, 1937. Tokumu Tokei (Statistics of Overseas Affairs), 1935. (In Japanese).

_____, 1940. Tokumu Tokei (Statistics of Overseas Affairs), 1938. (In Japanese).

_____, 1942. The Oriental Year Book 1942, Tokyo.

_____, 1943. Domei Jiji Nenkan (Domei current events year-book), 1943, compiled by the Domei News Agency, Tokyo. (In Japanese).

AKAZAWA, S., KASAI, K., 1929. Studies on the drug-fastness of rat-bite fever spirochete, Spirochaeta morsus-muris. 1. Bismuth fastness. Sixth Report of the Government Institute for Veterinary Research, Chosen, pp. 28-43, Aug. (In Japanese with English summary).

AOYAMA, M., 1937. Typhoid and paratyphoid fever in Koshu, Zenranando, Korea, and neighboring area. J. Chosen Med. Ass., 27: 1610. (In Japanese).

ARAKI, M., 1941. Studien uber die Dermatomykosen and ihre Erreger in Chosen. II. Mitteilung. Über die Trichophytie in Keijo und dessen Umgebung. Japanese J. of Dermatology and Urology, 50(1): 1-20, July. (In Japanese with German summary).

ARIMOTO, C., 1941. Statistical study of psoriasis in the last 10 years in Korea. Japanese J. of Dermatology and Urology, 49(1): 49, Jan. (In Japanese).

AVISON, D. B., 1942. Some Problems of Preventive Medicine in Korea. Bull. Acad. of Med., Toronto, 15(4): 76-82, Jan, 1942.

AVISON, O. R., 1925. Unusual Opportunities for Research in Eastern Lands. J. of Medicine and Surgery, Canada, 15(3): 87-95, Mar.

AWAYA, M., 1942. Infectious and Endemic Diseases of East Asia, 249 pp., Tokyo, Nov.

BUN, J., 1939. Studies of the endemic elephantiasis in southern Korea. J. Chosen Med. Ass., 29(4): 553-575; (5): 697-710, Apr.-May. (In Japanese with English summary).

_____, 1939. Studies of the endemic elephantiasis in Tyosen (Part II). J. Chosen Med. Ass., 29 (8): 1426-1442, Aug. (In Japanese with English summary).

_____, 1940. The etiological investigation of endemic elephantiasis—southern Korea. J. Chosen Med. Ass., 30 (7-8): 1136-1159, Aug. (In Japanese with English summary).

CATE, W. R., 1926. Typhoid fever in Korea. China Med. J., 40 (6): 554-558, June.

CHAGIN, K. P., KONDRAT'YEV, P. Ya., 1943. Vectors of autumnal (Japanese) encephalitis in the Primorskiy Region and methods of control. Meditsin-skaya Parazitologiya i Parazitarnyye Bolezni, 12 (2): 34-44.

CHIBA, E., 1928. Observations on the helminth eggs in vegetable contamination in Keijo. J. Chosen Med. Ass., 18: 809-829 (In Japanese with English summary).

_____, 1929. Studies on various intestinal protozoa of man in Chosen. I. Morphological studies upon Entamoeba histolytica Schaudinn. J. Chosen Med. Ass., 19 (10): 1280-1304, Oct. (In Japanese).

_____, 1929. Studies on various intestinal protozoa of man in Chosen. II. Morphological studies upon Entamoeba coli (Grassi, 1879) Casagrandi and Barbagallo 1895 (nec Lösch, 1875). J. Chosen Med. Ass., 19 (12): 1554-1568, Oct. (In Japanese).

_____, 1930. Species of intestinal protozoa in man in Korea and their infestation rate. J. Chosen Med. Ass., 20 (2): 249-250, Feb. (Abstract.) (In Japanese).

_____, 1930. Studies on various intestinal protozoa of man in Chosen. III. Morphological studies upon Iodamoeba bütschlii (Prowazek, 1912) Dobell, 1919. J. Chosen Med. Ass., 20 (10): 1442-1454, Oct. (In Japanese with English summary).

_____, 1930. Studies on various intestinal protozoa of man in Chosen. IV. Morphological studies upon Endolimax nana (Wenyon and O'Connor, 1917) Brug, 1918. J. Chosen Med. Ass., 20 (10): 1455-1466, Oct. (In Japanese with English summary).

_____, 1930. Studies on various intestinal protozoa of man in Chosen. V. Morphological studies upon Dientamoeba fragilis Jepps and Dobell, 1918. J. Chosen Med. Ass., 20 (11): 1547-1554, Nov. (In Japanese with English summary).

_____, 1931. Studies on various intestinal protozoa of man in Chosen. VI. Question as to whether Councilmania lafleuri Kofoid and Swezy, 1921 exists as a new species. J. Chosen Med. Ass., 12 (4): 480-490, Apr. (In Japanese with English summary).

_____, 1931. Studies on various intestinal protozoa of man in Chosen. VII. Morphological studies upon various flagellates. J. Chosen Med. Ass., 21 (4): 491-507, Apr. (In Japanese with English summary).

_____, 1931. Studies on various intestinal protozoa of man in Chosen VIII. A statistical survey for human protozoa in Chosen, Japan, with special reference to the cyst-carriers of Entamoeba histolytica. J. Chosen Med. Ass., 21 (4): 508-552, Apr. (In Japanese with English summary).

CHO, C. H., 1936. Clinical investigation of gastric acidity in cases with liver-fluke. J. Chosen Med. Ass., 26 (11): 1068-1074, Nov. (In Japanese with English summary).

CHO, K., 1934. Über den pathologisch-anatomischen und parasitologischen Befund eines Falles der heterotopisch parasitierten Paragonimiasis. J. Chosen Med. Ass., 24 (11): 1003-1014, July, 4 pls. (In Japanese with German summary).

CHO, T. S., 1938. A clinical study on relapsing fever. Part 1. Statistical observation of relapsing fever in Keijo District. J. Chosen Med. Ass., 28 (10): 1523-1529, Oct. (In Japanese with English summary).

CHOY, P. D., 1926. A case of tropical malaria in Korea. J. Chosen Med. Ass., 26 (5): 491-498, May. (In Japanese with English summary).

COCHRAN, S., 1914. Distribution of Kala azar in China and Korea, a report. China Med. J., 28 (4): 274-276, July.

DOI, K., 1932. Miscellaneous entomological notes. J. Chosen Natural Hist. Soc., 13: 30-49, Apr. (In Japanese).

DOI, T., BOK, S., 1924. On four cases of human infestation by Sparganum mansoni. J. Chosen Med. Ass., 50, 1924. (In Japanese). (Abstract Japanese J. Med. Sciences, VI, Bact. & Paras. 1 (2): 100, 1938).

ELISHEWITZ, H., 1943. The Ticks of the Pacific Region. Naval Med. Research Institute, Nat. Nav. Med. Center, Bethesda, Md., Research Project NMRI-19, Nov.

FARNER, D. S., KATSAMPES, C. P., 1944. Tsutsugamushi disease. U. S. Nav. Med. Bull., Vol. 43 (4): 800-836, Oct.

FUJITO, T., 1938. Studies on Culicoides miharai Kinoshita. First Report. J. Orient. Med., 29 (5): 1491, Nov. (In Japanese).

_____, 1939. On the ecological study of a sandfly. (Culicoides miharai Kinoshita). J. Chosen Med. Ass., 29 (5): 687-696; (6): 923-940, May-June. (In Japanese with English summary).

_____, 1939. Studies on Culicoides miharai Kinoshita from Moppo. J. Chosen Med. Ass., 29 (11): 2376-2377, Nov. (In Japanese).

FURONAKA, F., MASUDA, K., TAMURA, J., 1929. Beiträge zu den Untersuchangen bei Typhus abdominalis. J. Chosen Med. Ass., 19 (4): 545-564, Apr. (In Japanese with German summary).

FURUYAMA, T., 1927. On the helminthiasis in Shonei district in South Keisho-do with special reference to clonorchiasis. J. Chosen Med. Ass., 17 (82): 881. (In Japanese).

GEAR, H. S., 1934. The incidence of disease in selected hospitals in China for 1933. Chinese Med. Ass. Hospital Survey. Chinese Med. J., 48: 758-782.

_____, 1935. The incidence of venereal diseases in hospital patients in China. Chinese Med. J., 49 (10): 1122-1135, Oct.

HANASONO, M., UCHIDA, G., HEBIJIMA, I., 1940. Clinical and statistical observations of erysipelas. J. Chosen Med. Ass., 30 (4): 724-742, Apr. (In Japanese).

HARA, C., 1924. Report on investigation of lung flukes in Keisho-nando Province, Korea. Chosen Igk. Z., 49, 1924. (In Japanese). (Abstract Japanese J. Med. Sciences, VI, Bact. & Paras., 1 (2): 101, 1938).

HASHIMOTO, K., 1927. New epidemic areas of ankylostomiasis in Kankyo-hokudo, Chosen. J. Chosen Med. Ass., 17(82: 887, Nov. (In Japanese).

HIRONAKA, S., 1928. Clinical observations of an epidemic of rubeola (German measles) in Seoul. J. Chosen Med. Ass., 94: 1028-1037, Nov. (In Japanese).

HONDA, O., 1939. A malaria parasite on bird at Keijo. J. Chosen Med. Ass., 29 (11): 2375, Nov. (In Japanese).

HOSHI, N. YANO, S., KOIKE, N., SANO, G., 1933. Preventive inoculation against scarlet fever in young children in Korea. J. Chosen Med. Ass., 23 (4): 543-549, Apr. (In Japanese with English summary).

HSIAO, T Y., BOHART, R. M., 1946. The Mosquitoes of Japan and their medical importance. NavMed 1095, 44 pp., Sept.

IN, N., 1927. Elephantiasis caused by Filaria in Korea. J. Chosen Med. Ass., 17 (76): 326-334, May. (In Japanese).

INOUE, I., 1923. Dysentery bacillus in Seoul (Keijo), Korea, in last fall. Mansen Ikai, 22, 1923. (Abstract Japanese J. Med. Sciencies, VI, 1 (2): 114, 1938).

ISHIHARA, A., 1937. Klassifikation der Typhusbazillen formen in Keijo. J. Chosen Med. Ass., 27 (11): 1415-1424, Nov. (In Japanese).

_____, NAGAI, C., 1938. Statistical observations of typhoid fever among the adults in Keijo. J. Chosen Med. Ass., 28(2):278-293, Feb. (In Japanese).

_____, SANO, G., 1932. Statistical observations of dysentery patients in the last four years. J. Chosen Med. Ass., 12 (11): 1067-1068, Nov. (In Japanese).

_____, _____, IKKANDA, Y., 1938. Investigations of the bacillus-carriers of typhoid fever and dysentery and intestinal parasites in Keijo. J. Chosen Med. Ass., 28 (5): 776-780, May. (In Japanese).

ISSHIKI, O., 1934. Recent contributions in zoology relative to veterinary science in Korea. J. Chosen Nat. Hist. Soc., 18: 77, 90, June. (In Japanese).

JINNAI, R., FUJII, Y., 1937. Klinisch-statistische Beobachtungen über 108 Fälle von Erysipelas. J. Chosen Med. Ass., 20 (7): 677-685, July. (In Japanese with German summary).

KAN, S., 1939. Study on the bacillus type of diphtheria in Keijo. J. Chosen Med. Ass., 29(11): 2375-2376, Nov. (In Japanese).

KESSEL, J. F., 1925. A preliminary report on the incidence of human intestinal protozoan infections in Seoul, Korea. China Med. J. 39 (11): 975-982, Nov.

KIM, K., 1932. An unusual case of ascariasis. J. Chosen Med. Ass., 22(11): 1025-1027, Nov. (In Japanese).

KISHIDA, K., 1922. Ixodidae Murray, 1877, parasitic on Japanese Artiodactyla: Bunodontia. Dobutsu-gaku Zasu (Zoological Magazine), 34: 846-857.

_____, in Uchida, 1933. Nihon Dôbutsu Zukan (Figuraro de Japanaj Bestoj) Tokyo, pp. 952-991.

_____, 1936. Notes on the Acarina mites and ticks, from the Peninsula of Korea and the island of Quelpart collected in August, 1936. Lansania 8, No. 79, pp. 131-144, 1 fig., Tokyo, Oct. (In Japanese).

KŌ, H., 1936. On the existence of malignant malaria in Korea. J. Chosen Med. Ass., 26 (9): 920-922, Sept. (In Japanese).

KOBAYASHI, H., 1917. On the life history and morphology of liver-distome (Clonorchis sinensis). Mitteilungen aus der Medizinischen Fachschule zu Keijo, 1: 251-284, 5 pls.

_____, 1918. House frequenting flies and their seasonal prevalence in Japan and Korea. Mitteilungen aus der Medizinischen Hochschule zu Keijo, 2: 76-94.

_____, 1918. Studies on the lung-fluke in Korea. I. On the life history and morphology of the lung-fluke. Mitteilungen aus der Medizinischen Hochschule zu Keijo, 2: 95-113.

_____, 1919. Studies on the lung-fluke in Korea. II. Structure of the adult worm. Mitteilungen aus der Medizinischen Hochschule zu Keijo, 3: 16-36, 2 pls.

_____, 1921. Studies on the lung-fluke in Korea. III. Development in the first intermediate host and prophylactic measures against fluke-disease. Mitteilungen aus der Medizinischen Hochschule zu Keijo, 4 (1): 5-16, 1 pl.

_____, 1921. Over-wintering of flies. Japan Med. World, 1(3): 11-14, July.

_____, 1922. On the further notes of the over-wintering of house flies. Japan Med. World, 2 (7): 193-196, July.

_____, 1924. On the human liver-fluke in Korea and a note on the intermediate hosts of liver-fluke in China. Mitteilungen aus der Medizinischen Akademie zu Keijo, 7 (3): 1-10.

_____, 1924. On the habits of house-frequenting flies in Korea. Mitteilungen aus der Medizinischen Akademie zu Keijo, 7 (4): 11-19.

_____, 1925. On the animal parasites in Korea. Japan Med. World, 5 (1): 9-16, Jan.

_____, 1926. Two parasitic flies found in Korea. Kontyo, Tokyo, 1 (2): 90-91. (In Japanese).

_____, 1927. Parasite eggs attaching to vegetables. J. Chosen Nat. Hist. Soc., Keijo, 6: 1-6. (In Japanese).

_____, 1927. Study on the seasonal prevalence of house flies in Chosen (Korea). Trans. Seventh Cong., Far East Ass., Trop. Med., Calcutta (1927), 3: 186-195.

_____, 1927. Endemic areas of clonorchiasis along the Rakutō-kō valley. J. Chosen Med. Ass., 82 (17): 881-882, Nov. (In Japanese).

_____, 1928. On the animal parasites in Chosen (Korea). Second Report. Acta Medicinalia in Keijo, 11 (2): 109-125, May.

_____, 1929. General survey on the seasonal prevalence of the house fly in Chosen. First Report: Researches during 1928. Acta Medicinalia in Keijo, 12 (2): 59-65.

_____, 1931. Malaria and anopheline mosquitoes in Korea. J. Chosen Med. Ass., 21 (11): 1412, Nov. (In Japanese).

_____, 1931. Fishes in Japan as the intermediate hosts of intestinal parasites. J. Chosen Nat. Hist. Soc., Kejo, 12: 1-9, Dec. (In Japanese).

_____, 1932. On the habits of Anopheles in Chosen. J. Chosen Med. Ass., 22: 107-111. (In Japanese with English summary).

_____, 1933. The life history of Aëdes (Finlaya) koreicus Edwards in Korea. J. Chosen Nat. Hist. Soc., Keijo, 15: 1-4, Jan. (In Japanese).

_____, 1933. Human parasites of Korea. Trans. Nat. Hist. Soc. of Formosa, Taihoku, 23 (124): 68-72, Feb. (In Japanese).

_____, 1934. General survey on the seasonal prevalence of the house fly in Chosen. Second Report. Research during 1929. Keizyō Med. J., 5 (2): 69-77.

_____, 1934. The second intermediate host of Paragonimus westermani. J. Chosen Nat. Hist. Soc., Keijo, 18: 1-5, June. (In Japanese).

_____, 1939. Malaria in Eastern Asia. J. Chosen Med. Ass., 29 (11): 2385-2394, Nov. (In Japanese).

_____, CHIBA, E., FURUYAMA, T., 1929. On the incidence and degree of infestation with hookworm and Trichostrongylus orientalis in Keijo (Seoul), Chosen. Acta Medicinalia in Keijo, 12 (2): 66-72.

KOBAYASHI, S., 1921. On the development of the Paragonimus westermani and its prevention. Japan Medical World, 1 (1): 14-17.

KODAMA, T., 1930. A study of a certain parasite found on Anopheles, with statistics concerning malaria. J. Public Health Ass., Japan, 6 (4): 166-179, Apr. (In Japanese).

KOGA, Y., HIDAKA, H., KIN, S. T., 1937. Untersuchuhgen über die Häufigkeit der Auffindung von Ruhrbazillen und Ruhr-Bakteriophagen in Faeces von Ruhrkranken. J. Chosen Med. Ass., 27 (7): 733-740, Jul. (In Japanese with German summary).

KOIDZUMI, M., 1932. Pulicidae. Nippon Konchu Zukan (Iconographia Insectorum Japonicorum) Tokyo, pp. 2-6. (In Japanese).

KOMADA, K., 1932. On the cultivation of Balantidium coli (Malmsten). J. Chosen Med. Ass., 22: 369-377. (In Japanese with English summary).

KONO, H., TAKAHASI, H., 1939. Die Tabaniden von Korea. Insecta Matsumurana, 14 (1): 6-19, Dec.

_____, _____, AOKI, H., 1940. Über die Larven der Tabaniden von Japan. Kontyo, Tokyo, 14 (1): 1-11. (In Japanese with German title).

_____, _____, _____, 1940. Über die Puppe der Tabaniden von Japan. Kontyo, Tokyo, 14(1): 12-22. (In Japanese with German title).

KURAHASHI, T., 1926. On a case of Filaria medinensis occurring in Korea. Chosen Igakkai Zassi (J. Chosen Med. Ass.) (1926), 68. (Abstract: Japanese J. Bact. & Paras. Med. Sciences, VI, 1 (4): 235, 1940).

KYO, K., KIN, K., and MATSUDA, I., 1939. Experimental inoculation of typhus recently occurring in Keijo. J. Chosen Med. Ass., 29 (11): 2377-2378, Nov. (In Japanese).

LUDLOW, A. I., 1917. Abscess of the liver. China Med. J., 31 (3): 207-212, May.

_____, 1920. Abscess of the liver (supplementary report). China Med. J., 34 (3): 258-261, May.

_____, 1943. Relapsing Fever in Korea. Ohio Med. J., 39 (11): 1001-1013.

_____, 1943. Experiences with typhus fever. Bull. Acad. Med, Cleveland, 28 (8): 11-12, Aug.

MACHIDA, T., AOYAMA, T., 1928. Injurious Insects of Korea, Vol.1, pp. 303-304, Nov., Pusan. (In Japanese).

MAKI, M., 1931. Monograph of the Snakes in Japan, Tokyo, 240 pp.

MATSUOKA, K., 1929. Statistical observation of typhoid fever in Keijo, Chosen and of an epidemic in 1928. J. Public Health Ass. of Japan, Tokyo, 5 (9): 358-372, Sept. (In Japanese).

MIDZUKI, M., NIHARA, Y., 1927. A list of known species of Culicidae from Japan. The Insect World, Gifu, Japan, 31 (11): 362-368; (12): 398-402. (In Japanese).

MIKAMI, M., 1928. Clinical observations of scarlet fever patients and their blood picture. J. Chosen Med. Ass., 18 (94): 1071, Nov. (In Japanese).

_____, 1932. Clinical observations of scarlet fever patients and their blood picture. J. Chosen Med. Ass., 22(4): 378-392, Apr. (In Japanese).

MILLS, R. G., 1911. A contribution to the nosogeography of northern Korea. The China Med. J., 25(5): 277-293, Sept.

MIWA, T., 1935. On the helminthes infections in Moppo District, South Zenra-do. J. Chosen Med. Ass., 25 (5): 527-532, May. (In Japanese with English summary).

_____, 1935. Helminthes infection in Kokai District, North Heian-Do, especially of the hookworm infection. J. Chosen Med. Ass., 25 (5): 533-540, May. (In Japanese with English summary).

MIYAGAWA, R., 1908. Report of hygienic conditions of Hokusei, Korea. Kaigun Iji Hôkoku Saigô (Medical report by the Medical Bureau of the Navy Department of Japan), Tokyo, No. 50: 275-281, Dec. (In Japanese).

_____, ITO, K., 1908. Report of the expedition to Shaho-wan, northern Korea. Kaigun Iji Hôkuku Saigô (Medical report by the Medical Bureau of the Navy Department of Japan), Tokyo, No. 50: 226-233, Dec. (In Japanese).

MIYANAGA, S., 1938. Snails of Korea. J. Orient. Med., 29 (5): 1478-1479, Nov. (Abstract). (In Japanese).

MIYASHITA, S., 1929. Das Trachom in Japan und den Grenzgebieten Chinas. XIII. Concilium Ophthalmologicum. Hollandia. Symposia, 3: 169-200, 1929.

MIYAZAKI, M., 1941. A case of Sparganum mansoni. The Japanese J. of Dermatology and Urology, 49 (1): 43, Jan. (In Japanese).

MORI, T., 1936. Studies on the geographical distribution of fresh water fishes in Chosen. Bull. Biogeographical Soc., Japan, 6 (7): 35-70.

MORIOKA, I., OGINO, M., 1929. The result of Dick test and the preventive vaccination for scarlet fever applied to school children in Seoul, Chosen. J. of Public Health Ass. of Japan, 5(3): 112-114, Mar. (In Japanese with English summary).

MORIYASU, I., FUJIMOTO, S., 1933. Statistische Beobachtungen über die Leprakranken in unserer Klinik. I. Mitteilung. J. Chosen Med. Ass., 23 (12): 1853-1866, Dec. (In Japanese with German summary).

NAGAHANA, M., 1932. The morphology and cultivation of a Balantidium found in the wild-cat (Mus norvegicus Erxl.) J. Chosen Med. Ass., 22: 355-368, 2 pls. (In Japanese with English summary).

_____, 1934. Bed-bugs in Korea. J. Chosen Nat. Hist. Soc., Keijo, No. 17: 6-16, Feb. (In Japanese).

_____, 1937. Rat survey in Chosen (Korea). I. The species and distribution of rats in Chosen. J. Chosen Med. Ass., 27 (10): 1221-1229, Oct. (In Japanese with English summary).

_____, 1937. Rat-flea survey in Chosen (Korea). I. The species and distribution of rat-fleas in Chosen. J. Chosen Med. Ass., 27 (11): 1343-1353, Nov. (In Japanese with English summary).

_____, 1937. Rat-flea survey in Chosen (Korea). II. The seasonal prevalence of rat-fleas in Keijo. J. Chosen Med. Ass., 27 (12): 1637-1644, Dec. (In Japanese with English summary).

_____, 1938. Rat survey in Chosen (Korea). II. Rat survey of Husan, Oupei-Men (a village on the outskirts of Keijo) and Singisyu. J. Chosen Med. Ass., 28 (6): 806-809, June. (In Japanese with English summary).

_____, 1938. Rat-flea survey in Chosen. III. Rat-flea survey of the Port of Husan. J. Chosen Med. Ass., 28 (6): 810-819, June. (In Japanese with English summary).

_____, 1938. Rat-flea survey in Chosen (Korea). IV. Rat-flea survey of Ompei-men (a village on the outskirts of Keijo). J. Chosen Med. Ass., 28 (7): 964-970, July. (In Japanese with English summary).

_____, 1938. Rat-flea srrvey in Chosen (Korea). V. Rat-flea survey of Singisyu. J. Chosen Med. Ass., 28 (7): 971-977, July. (In Japanese with English summary).

_____, NAKADA, K., 1934. Bibliography on Korean parasites. J. Chosen Nat. Hist. Soc. No. 19: 88-169, Sept. (In Japanese).

NAGAI, C., 1935. Statistical observations of typhoid fever. J. Chosen Med. Ass., 25 (11): 1592-1593, Nov. (In Japanese).

NAGAI, H., 1925. Paragonimus westermani in Korea. Gunidan Zassi (Official Publication of the Imperial Japanese Army Medical Corps), No. 147: 1149-1180, Sept. (In Japanese).

NAKAMURA, K., KOBASHI, S., 1935. Rats in Keijo and Jinsen and their parasites. J. Chosen Med. Ass., 25 (5): 695-698, May. (In Japanese).

_____, MATSUMOTO, I., and TACHIBANA, S., 1935. Ueber die im zoologischen Garten "Shokeien" zu Keijo (Korea) ausgebrochene Rotzerkrankungen der Ranbtiere. J. Chosen Med. Ass., 25 (9): 1335-1347, Sept.

_____, RO, T., 1935. Erruptive fever in the P'yongyang (Heijo) region. J. Chosen Med. Ass., 25 (11): 1597-1598, Nov. (In Japanese).

NAKANISHI, G., 1939. Paratyphoid A found in Keijo. J. Chosen Med. Ass., 29 (6): 1112-1119, June. (In Japanese).

_____, INOUE, K., NISHIYAMA, J., and UEDA, R., 1935. Typhus fever in Keijo in the spring of 1935. J. Chosen Med. Ass., 25 (11): 1599, Nov. (In Japanese).

_____, ZEN, S., 1936. Three cases of subtertian malaria. (Abstract). J. Orient. Med., Dairen, 25 (5): 1273, Nov. (In Japanese).

_____, ____, 1938. Three cases of subtertian malaria. (Abstract). J. Chosen Med. Ass., 26: 1126-1127. (In Japanese).

NAKANISHI, S., MORI, Y., 1936. A case of intestinal myiasis. J. Chosen Med. Ass., 26 (8): 815-819, Aug. (In Japanese).

NAKATA, K., 1934. A case of infestation with Thelazia callipaeda in a Korean girl. J. Chosen Med. Ass., 24 (6): 939-944, 1 pl. June. (In Japanese with English summary).

_____, 1935. A Rhabditis from human feces. J. Chosen Med. Ass., 25 (3): 308-317, 1 pls. (In Japanese with English summary).

NEUMANN, L. G., 1911. Ixodidae. Königl. Preuss. Akademie der Wissenschaften zu Berlin, XV & 169 pp., June.

NINOMIYA, T., TSUMURA, H., 1939. Cholera epidemic in Kokai-do in 1938 and its control. J. Chosen Med. Ass., 29(7): 1395-1402, July. (In Japanese).

NISHIMURA, K., SEKIGUCHI, C., 1934. A case of intestinal obstruction due to ascaris. J. Chosen Med. Ass., 24 (4): 676-679, Apr. (In Japanese).

NIWA, S., 1927. On the conditions of the girl entertainers in Korea and the situation of venereal diseases. J. Chosen Med. Ass., 82: 874-876, Nov. (In Japanese).

NOBUDA, H., 1933. Clinical observations of scarlet fever, especially on the types of fever. J. Chosen Med. Ass., 23 (11): 1525, Nov. (In Japanese).

NUTTALL, G. H. F., WARBURTON, C., 1908-1926. Ticks. A Monograph of the Ixodoidea. Cambridge, England, Vol. 1, University Press.

OCHIAI, T., 1940. Statistics of the mortality of the Japanese in Korea, 1933-1937. J. Chosen Med. Ass., 30 (7-8): 1390-1410, Aug. (In Japanese).

ODA, M., 1927. On the human parasite eggs attached to the vegetables and the effectiveness of water rinsing as a means of eliminating them. J. Chosen Med. Ass., 73: 26-32, Feb. (In Japanese with English summary).

____, 1929. Über die Verbreitung der Menschenparasiten im Zenshu-Distrikt. J. Chosen Med. Ass., 19 (8): 1044-1049, Aug. (In Japanese with German summary).

OGURA, K., 1935. Examinations for parasite eggs and Endameba histolytica in the filth of fingernails of school-children. J. Chosen Med. Ass., 25 (11): 1628, Nov. (In Japanese).

_____, 1936. Studies on the Hymenolepis nana in Korea. J. Chosen Med. Ass., 26: 649-668, 1 pl. (In Japanese with English summary).

_____, OKUDA, M., 1933. Three cases of Hymenolepis nana from Korea. J. Chosen Med. Ass., 23 (11): 1547, Nov. (In Japanese).

OH, H. Y., 1929. Filariasis in Korea. China Med. J., 43 (1): 16-21, Jan.

OKAMOTO, H., 1924. The Insect Fauna of Quelpart Island (Saishiu-to). Bull. Agricultural Experimental Station, Government-General of Chosen, 1 (2): 47-233, Ill.

OKINAMI, M., 1936. A poisonous moth, Euproctis flava Bremer and its poison. J. Chosen Med. Ass., 26 (9): 923-936, Sept.

_____, 1936. Morphological study of egg, larva and pupa of Aëdes koreicus. J. Orient. Med., Dairen, 25 (5): 1268, Nov. (Abstract). (In Japanese).

OMORI, N., 1941. A synopsis of Anopheles of the Pacific Area. Published by the Institute of Tropical Diseases, Report No. 453, Jun.

OSAWA, K., 1927. Malaria in the Kankō Infantry Regiment and the anophelines in the vicinity of Kankō. J. Chosen Med. Ass., 17 (No. 82): 882-886, Nov. (In Japanese).

RHI, J., TEI, M., 1934. The relation of the intracutaneous tuberculin reaction to the physical constitution of Korean schod children. J. Chosen Med. Ass., 24(8): 1080-1094, Aug; Keijo Med. J., 5 (3): 217-228, Sept. (In Japanese with English summary).

RI, S., 1939. Bacillus types of dysentery in Keijo, 1939. J. Chosen Med. Ass., 29 (11): 2376, Nov. (In Japanese).

SAI, K., 1936. Hygienic study of deaths of Japanese in Chosen. J. Chosen Med. Ass., 26 (8): 728-751, Aug. (In Japanese with English summary).

SAI, Seisen, 1939. Klinische Beobachtungen der Moriyaschen Modifikation der Bachmannaschen serologischen Reaktion für Lues. J. Chosen Med. Ass., 29 (9): 1756-1767, Sept. (In Japanese with Germany summary).

SAI, Sosai, 1934. Statistical observation of tuberculosis of the joints. J. Chosen Med. Ass., 24 (1): 221-227, Jan. (In Japanese).

SAI, T., 1926. On the results of examination of the intestinal parasites and visceral parasites of the Koreans. Chosen Igk. Z. No. 66, 1926. (Abstract: Japanese J. of Med. Sciences, VI, Bact. & Paras., 1 (4): 229, 1940).

SAITO, T., 1930. A species of Liponyssus parasitic on rat and attacking man. Second Report. J. Chosen Med. Ass., 20 (11): 1807-1808, Nov. (In Japanese).

SANO, G., FUKUDA, S., 1933. First Report of epidemic erythema (the fifth disease) in Korea. J. Chosen Med. Ass., 23 (11): 1525-1526, Nov. (In Japanese).

_____, _____, 1934. Zur Epidemie von Erythema infektiosum in Korea. J. Chosen Med. Ass., 24 (1): 154-166, Jan. (In Japanese with German summary).

SHIBA, N., 1933. Study of the first intermediate host of Clonorchis sinensis in Korea. J. Chosen Med. Ass., 23 (11): 1546-1547, Nov. (In Japanese).

_____, 1934. Species of Lymnaea of Korea and their distribution. J. Chosen Med. Ass., 24 (8): 1131, Aug. (In Japanese).

SHIGA, K., 1927. On public health in Chosen. An address delivered at the 18th Biannual Conference of the China Medical Association, held at Peking, 1 Sept 1926. Mitteilungen aus der Medizinischen Akademie zu Keijo, 10 (1): 251-258.

SHIIBA, F., NAKANISHI, G., and Zen, S., 1936. The first case of malignant malaria in Keijo. J. Chosen Med. Ass., 26(7): 669-680, July. (In Japanese).

_____, _____, SAI, Seisen, CHIIWA, C., 1938. Statistical observation of diphtheria patients, with special reference to the comparison of the Japanese with Koreans. J. Chosen Med. Ass., 28 (7): 1028-1043, July. (In Japanese).

SHIN, H., 1933. On a rare case of Sparganum mansoni in human body in Chosen (Korea). J. Chosen Med. Ass., 23(10):1329-1333 (In Japanese).

SHINGU, S., 1927. Bacteriological and Clinical Observations of Dysentery Epidemic among children during the current year. J. Chosen Med. Ass., 82: 904-905, Nov. (In Japanese).

SHIRAKI, T., 1932. Tabanidae. in Esaki et al.: Nippon Konchu Zukan (Iconographia Insectorum Japonicorum), Tokyo, pp. 145-154. (In Japanese).

STRYKER, E. de M., 1914. Extracts from report of E. de M. Stryker, M. D., for 1913, Suan Mine Hospital, Korea. China Med. J., 28 (4): 277-280, July.

SUO, M., ICHIHARA, T., 1939. Weil-Felix reaction of the house rat captured in Sorok To. J. Chosen Med. Ass., 29 (11): 2378, Nov.

TAKAGI, S., 1931. Malaria in Korea. J. Chosen Med. Ass., 21 (11): 1412, Nov. (In Japanese).

TAKAHASHI, I., 1941. Chosen Nenkan (Chosen yearbook), Keijo, 1940, 734 pp. (In Japanese).

TAKEMURA, S., KUWABARA, N., 1931. Observations on Entamoeba gingivalis and Trichomonas buccalis in Chosen, and notes on the resistance of the cultured forms of E. gingivalis to physical and chemical agents. J. Chosen Med. Ass., 21 (10): 1254-1265, Oct. (In Japanese with English summary).

TAKIDA, S., 1931. Über die Typien der Deysenteriebazillen in Nordkorea. Gunidan Zassi (Official Publication of the Imperial Japanese Army Medical Corps), No. 128 (Extra): 1409-1457. (In Japanese with German summary).

_____, 1932. Epidemiological investigations of the contagious diseases in Korea. Gunidan Zassi (Official Publication of the Imperial Japanese Army Medical Corps), No. 224: 295-306; No. 225: 388-436; No. 226: 552-582, Feb-Apr. (In Japanese).

TANABE, M., 1927. Distribution of malaria in Korea: Prevalence of malaria in Shunsen and Tetsugen, Kogen-do. J. Chosen Med. Ass., 82: 882, Nov.

_____, 1939. Observation on malignant-malaria in Korea. Volumen Jubilare pro Professore Sadao Yoshiad, 1: 211-219. (In Japanese).

TANIGUCHI, S., 1929. Studies of amebic dysentery. 16 Distributions of amebic dysentery. J. Orient. Med., 30(2): 93-94, Feb. (In Japanese).

TANIGUTI, Y., 1939. Extension of the complete expectation of life for each prefecture in Japan by eliminating the deaths due to tuberculosis 1925-1930, 1931-1935. J. Chosen Med. Ass., 29 (11): 2153-2170, Nov. (In Japanese with English summary).

TIKANO, H., 1931. Prophylatische Brobachtung von Bacillen-Dysenterie in Nord-Korea. Gunidan Zassi (Official Publication of the Imperial Japanese Army Medical Corps), 216: 901-924. (In Japanese with German summary).

TOKUNAGA, I., 1927. Clinical observations on whooping cough. J. Chosen Med. Ass., No. 82: 905, Nov. (In Japanese).

TOKUNAGA, M., 1937. Sand Flies (Ceratopogonidae, Diptera) from Japan. Tenthredo (Acta Entomologica), 1 (3): 234-338, 6 pls., May.

_____, 1940. Biting midges from Japan and neighboring countries, including Micronesian Islands, Manchuria, north China and Mongolia. (Diptera, Ceratopogonidae). Tenthredo 3 (1): 58-100; 3 (2): 101-165.

TSUGAWA, T., 1930. Recent malarial situation in the 20th Division. (Abstract). J. Chosen Med. Ass., 20 (11): 1806-1807, Nov. (In Japanese).

TSUMURA, H., 1939. Hygienic investigation in the mines in Kokai-do. J. Chosen Med. Ass., 29 (11): 2400-2402, Nov. (In Japanese).

UEDA, T., 1938. The poisonous moth in Korea. J. Chosen Nat. Hist. Soc., Keijo, No. 24: 39-41, Dec. (In Japanese).

U. S. WAR DEPARTMENT, 1945. Medical and Sanitary Data on Korea. TB MED 208, No. 83, Dec.

USHIJIMA, K., 1938. An abnormal case of pulmonary distomiasis. J. Chosen Med. Ass., 28 (7): 1022-1027, July. (In Japanese).

USHIJIMA, T., 1934. Lymphogranulomatosis inguinalis (the fourth disease) in Keijo. J. Chosen Med. Ass., 24 (5): 923-938, May. (In Japanese).

VAN BUSKIRK, J. D., 1927. Public Health problems in Korea, as shown by a study of child mortality. China Med. J., 41 (3): 244-250, Mar.

WATANABE, Y., TSUBOUCHI, J., 1911. Report of the conditions along the east coast of Northern Korea. Kaigun Iji Hôkoku Saigô (Med. report by the Medical Bureau of the Navy Department of Japan), Tokyo, 55: 430-474, June. (In Japanese).

WEIR, H. H., 1915. A continued fever of Korea. China Med. J., 29(5): 307-316, Sept.

WILSON, R. M., 1943. Impressions of Diet and Disease in Korea. Virginia Med. Monthly, 70 (3): 149-152, Mar.

YAMADA, M., 1934. A Korean Anopheles different from those hitherto described. J. Chosen Med. Ass., 23 (11): 1543, Nov. (In Japanese).

_____, 1936. Four kinds of Anopheles mosquitoes in Chosen. Keizyô J. of Med., 7 (2): 191-210, pls. 7-17, Sept.

_____, 1936. Zoophilism and Anthropophilism of Anopheline mosquitoes and the blooding habit of A. sinensis in Chosen. J. Chosen Med. Ass., 26 (11): 1046-1059, Nov. (In Japanese with English summary).

_____, 1937. A new species of Anopheles in Chosen (Korea). Keizyô J. of Med. 8 (3): 237-255, pls. 3-7, Oct.

YAMADA, S., 1921. Descriptions of ten new species of Aëdes found in Japan, with notes on the relation between some of these mosquitoes and the larva of Filaria bancrofti Cobbold. Annotationes Zoologicae Japonenses, 10: 45-81, Oct.

_____, 1924. A revision of the adult mosquitoes of Japan: Systematic descriptions, their habits, and their relations to human diseases. Part II. Sci. Rpts. Govt. Inst. Infec. Dis., 4: 447-493.

_____, 1932. Family Culicidae. in Esaki et al.: Nippon Konchu Zukan (Iconographia Insectorum Japonicorum) Tokyo, pp. 210-235. (In Japanese).

_____, KOMORI, K., 1926. From what point of the proboscis of the mosquito do developed larvae of Filaria bancrofti escape? Sci. Rpt. Govt. Inst. Infec. Dis., 5: 647-651, 1 pl.

YAMAMOTO, M., SANO, G., and IKKANDA, Y., 1939. Result of inoculation of a mixed anatoxin of scarlet fever and diphtheria. J. Chosen Med. Ass., 29 (10): 2103-2112, Oct. (In Japanese).

YAMAZAKI, Y., 1935. Fecal examination for parasite eggs among the inhabitants of Suigen. J. Chosen Med. Ass., 25 (11): 1628-1630, Nov. (In Japanese).

_____, 1936. Das Ergebnis der Parasiteneier-Untersuchungen des Verdauungsorgans von Bewohner im Suigen Gegen. J. Chosen Med. Ass., 26 (5): 464-468, May. (In Japanese with German summary).

YANG, T. K., 1928. Problems of cholera in China and Japan. J. Orient. Med., Dairen, 9 (3): 29-34.

YASUDA, M., 1938. Myiasis, especially by blowfly. J. Chosen Med. Ass., 28: 433-443; 611-622; 757-775.

_____, 1939. Studies on fly larvae. I. On the diagnostic characters of the larvae of certain house flies in Keijo. J. Chosen Med. Ass., 29 (5): 744-768, pls. 7, fig. 128, May.

_____, 1939. Studies on fly larvae. II. The influence of some environmental conditions on the development. J. Chosen Med. Ass., 29 (6): 1024-1084, June.

_____, 1939. Studies on fly larvae. III. The resistance of fly larvae to some environmental conditions. J. Chosen Med. Ass., 29 (7): 1200-1216, Jul. (In Japanese with English summary).

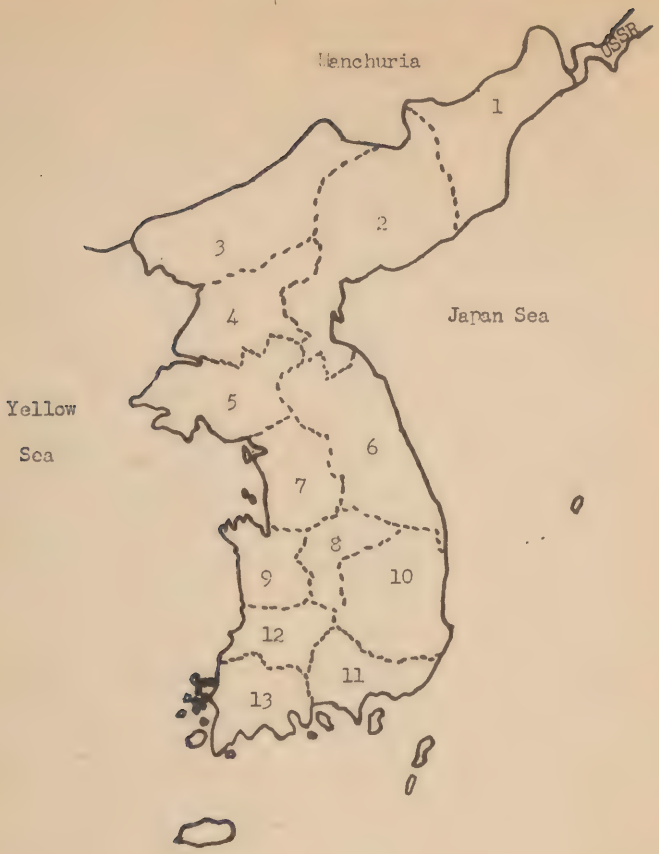
YOKOGAWA, S., MORISHITA, K., 1931-1933. Human Helminthology, Tokyo, 1: 529-538, 1931; 2: 603-607, 1933.

YOKOO, T., HOASHI, J., 1941. Investigation of blood-sucking insects of sheep in Korea. I. Stomoxys group: species, morphology, distribution and ecology. Oyo-Dobutsugaku-Zasshi, (J. of Applied Zoology), Tokyo, 13 (1): 13-38. (In Japanese).

YOSHIWARA, H., 1932. Epidemic encephalitis occurring in Keijo last summer. J. Chosen Med. Ass., 22 (11): 1036, Nov. (In Japanese).

ZEN, S., TSUCHII, J., and OKAMI, M., 1937. Statistical observations of the typhoid fever patients admitted to the Municipal Sumwha Hospital, Keijo, 1935. J. Chosen Med. Ass., 27 (7): 741-762, July. (In Japanese).

PROVINCIAL DIVISION OF KOREA



	Korean Romanization	Japanese Romanization
1.	Hamgyŏng-pukto	Kankyō-hokudō
2.	Hamgyŏng-namdo	Kankyō-nandō
3.	P'yŏngan-pukto	Heian-hokudō
4.	P'yŏngan-namdo	Heian-nandō
5.	Hwanghae-do	Kōkai-dō
6.	Kangwŏn-do	Kōgen-dō
7.	Kyŏnggi-do	Keiki-dō
8.	Ch'ungch'ŏng-pukto	Chūsei-hokudō
9.	Ch'ungch'ŏng-namdo	Chūsei-nandō
10.	Kyŏngsang-pukto	Keishō-hokudō
11.	Kyŏngsang-namdo	Keishō-nandō
12.	Chŏlla-pukto	Zenra-hokudō
13.	Chŏlla-namdo	Zenra-nandō

LIST OF LOCALITIES IN

KOREAN AND JAPANESE ROMANIZATION

Korean Romanization	Japanese Romanization	Latitude (N.)	x	Longitude (E.)
Amnok-Kang (Yalu River)	Oryokko			
Anak	Angaku			
Anbyŏn	Ampen	39°02	x	127°32
Andong	Antō	36°34	x	128°44
Anju	Anshū	39°36	x	125°40
Asan	Gazan	36°52	x	126°58
Chaeryŏng	Sainei	38°24	x	125°38
Changdan	Chōtan	37°56	x	126°46
Changhŭng	Chōkō	34°40	x	126°54
Changja-San	Chojusan	38°28	x	127°26
Changjin	Chōshin	40°54	x	127°10
Ch'angnyŏng	Shonei	35°32	x	128°30
Ch'angsŏng	Shojō	40°30	x	125°02
Changsu	Chōsui	35°38	x	127°32
Ch'angwŏn	Shōgen	35°16	x	128°38
Changyŏn	Chōen	38°16	x	125°06
Chasŏng	Jijō	41°28	x	126°38
Chech'ŏn	Teisen	37°08	x	128°12
Cheju	Saishū	33°30	x	126°32
Cheju-Do (Quelpart)	Saishu-to	33°24	x	126°34
Chilgok	Shikkoku	35°56	x	128°33
Chinch'ŏn	Chinsen	36°52	x	127°26
Chinhae-Man	Chinkaiwan	35°02	x	128°34
Chinnamp'o	Chinnampo	38°44	x	125°24

Korean Romanization	Japanese Romanization	Latitude (N.)	x	Longitude (E.)
Chinju	Shinshu	35°12	x	128°04
Chinwi	Shini	37°06	x	127°06
Chinyŏng	Shinei	35°18	x	128°44
Ch'ŏnan	Tenan	36°48	x	127°10
Ch'ŏngdo	Seidō	35°38	x	128°42
Ch'ŏngjin	Seishin	41°46	x	129°49
Chŏngju	Teishū	39°42	x	125°12
Ch'ŏngju	Seishū	36°38	x	127°30
Chŏngp'yong	Teihei	39°48	x	127°22
Chŏngsŏn	Seizen	37°22	x	128°40
Ch'ŏngsong	Seishō	36°26	x	129°04
Chongsŏng	Shojo	42°45	x	129°45
Chŏngŭp	Seiyu	35°34	x	126°52
Ch'ŏngyang	Seiyō	36°26	x	126°48
Ch'ŏngyang-ni	Seiryori	37°34	x	127°03
Chŏnju	Zenshū	35°48	x	127°08
Ch'ŏrwŏn	Tetsugen	38°14	x	127°12
Ch'osan	Sozan	40°50	x	125°48
Ch'unch'ŏn	Shunsen	37°52	x	127°44
Chunghwa	Chūwa	38°52	x	125°48
Ch'ungju	Chūshū	36°58	x	127°56
Dok-do	Tokutō (Tokuson)	37°34	x	127°00
Hadong	Katō	35°04	x	127°44
Haeju	Kaishū	38°02	x	125°42
Haenam	Kainan	34°34	x	126°36
Haman	Kanan	35°14	x	128°26
Hamhŭng	Kankō	39°54	x	127°32
Hamp'yŏng	Kampei	35°04	x	126°30
Hamyang	Kanyō	35°30	x	127°44

Korean Romanization	Japanese Romanization	Latitude (N.)	x	Longitude (E.)
Han-Gang (River)	Kankō			
Hoengsŏng	Ōjō	37'30	x	127'59
Hoeryŏng	Kainei	42'25	x	129'49
Hoeyang	Waiyō	38'42	x	127'36
Hongsŏng	Kōjō	36'36	x	127'40
Hongwŏn	Kōgen	40'02	x	127'58
Huch'ang	Kōshō	41'24	x	127'04
Hŭich'ŏn	Kisen	40'10	x	126'16
Hwach'ŏn	Kasen	38'06	x	127'42
Hwangju	Kōshū	38'40	x	125'46
Hyŏpch'ŏn	Kyōsen	35'34	x	128'10
Ich'ŏn	Risen	37'16	x	127'26
Ich'ŏn	Isen	38'30	x	126'54
Iksan	Ekizan	36'00	x	127'04
Inch'ŏn (Chemulpo)	Jinsen	37'28	x	126'38
Inje	Rintei	38'04	x	128'10
I-ri	Ri-ri	35'56	x	126'56
Kaech'ŏn	Kaisen	39'40	x	125'58
Kaesŏng	Kaijo	37'58	x	126'34
Kangdok	Kotoku	34'20	x	126'46
Kangdong	Kōtō	39'08	x	126'40
Kanggyong	Kōkei	36'10	x	127'02
Kanggye	Kōkai	40'58	x	126'36
Kanghwa	Kōka	37'44	x	126'30
Kangjin	Kōshin	34'38	x	126'46
Kangnŭng	Kōryō	37'44	x	128'54
Kangsŏ	Kōsei	38'58	x	125'28
Kapsan	Kōzan	41'06	x	128'18
Ka-San	Kazan	36'02	x	128'34

Korean Romanization	Japanese Romanization	Latitude (N.)	x	Longitude (E.)
Kilchu	Kisshū	40'58	x	129'20
Koch'ang	Kōshō	35'26	x	126'42
Kŏch'ang	Kyoshō	35'42	x	127'54
Koesan	Kaizan	36'48	x	127'48
Kohŭng	Kōkō	34'36	x	127'18
Kongju	Kōshū	36'28	x	127'08
Kosŏng	Kōjō	38'40	x	128'18
Kŏsŏng	Kojō	34'58	x	128'20
Koyang	Kōyō	37'42	x	126'54
Kŭmch'ŏn	Kinsen	38'10	x	126'28
Kŭm-Gang (River)	Kin-Kō			
Kŭmhae	Kinkai	35'14	x	128'52
Kumje	Kintei	35'48	x	126'52
Kŭmhwa	Kinka	38'18	x	127'28
Kŭmp'o	Kimpo	37'38	x	126'42
Kŭmsan	Kinzan	36'06	x	127'30
Kunsan	Gunzan	36'00	x	126'42
Kurye	Kyūrei	35'12	x	127'28
Kwangju	Kōshū	37'28	x	127'10
Kyeryong-san	Keiryusan	34'52	x	128'36
Kyŏnghŭng	Keiko	42'35	x	130'30
Kyŏngju	Keishū	35'50	x	129'12
Kyŏngsan	Keizan	35'48	x	128'44
Kyŏngsŏng (Seoul)	Keijō	37'34	x	127'00
Kyŏngsŏng	Kyōjō	37'34	x	127'00
Kyŏngwŏn	Keigen	39'00	x	127'30
Maengsan	Mōsan	39'40	x	126'30
Masan	Masan	35'12	x	128'34
Miryang	Mitsuyō	35'30	x	128'46

Korean Romanization	Japanese Romanization	Latitude (N.)	x	Longitude (E.)
Mokp'o	Moppo	34°48	x	126°42
Muan	Muan	34°58	x	126°28
Muju	Moshu	41°22	x	127°06
Mumch'ŏn	Bunsen	39°18	x	127°18
Mun'gyŏng	Bunkei	36°44	x	128°06
Myobang-San	Myobansan	35°36	x	128°34
Najin	Rashin	42°10	x	130°15
Naju	Rashū	35°02	x	126°44
Naktong-Gang	Rakutōkō			
Namhae	Nankai	34°50	x	127°54
Namp'yŏng	Nampei	35°02	x	126°50
Namwŏn	Nangen	35°24	x	127°22
Nanam	Ranan	41°42	x	129°41
Nonsan	Ronzan	36°12	x	127°04
Noryangjin	Roryōshin	37°30	x	126°56
Okch'ŏn	Yokusen	36°18	x	127°34
Ongjin	Ōshin	37°56	x	125°22
P'aju	Hashū	37°50	x	126°50
Pakch'ŏn	Hakusen	39°44	x	125°34
P'ohang	Hoko	36°02	x	129°52
Pongsan	Hōsan	38°30	x	125°50
Poryŏng	Honei	36°24	x	126°34
Posŏng	Hōjō	34°46	x	127°04
Poŭn	Hoon	36°28	x	127°42
Puan	Fuan	35°44	x	126°44
Pukch'ŏng	Hokusei	40°14	x	128°18
P'ungsan	Hōzan	40°48	x	128°10
Puryŏng	Funei	41°02	x	128°24
Pusan	Fusan	35°06	x	129°02

Korean Romanization	Japanese Romanization	Latitude (N.)	x	Longitude (E.)
Puyo	Fuyo	36°16	x	126°54
P'yŏngch'ang	Heisho	37°22	x	128°24
P'yŏnggang	Heikō	38°24	x	127°18
Pyŏngwŏn	Heigen	40°38	x	126°50
P'yŏngyang	Heijo	39°01	x	125°44
Sach'ŏn	Shisen	35°04	x	128°06
Sangju	Shōshū	36°24	x	128°10
Sariwŏn	Shariin	38°30	x	125°44
Sech'ŏn	Saisen			
Sihŭng	Shikō	37°26	x	126°54
Sinŭiju	Shingishū	40°06	x	124°24
Sobaek-San	Shohakusan	40°20	x	126°54
Sŏch'ŏn	Josen	36°04	x	126°42
Sogwang-Sa	Shakuoji	36°58	x	129°12
Sŏhŭng	Zuikō	38°28	x	126°10
Sŏnch'ŏn	Sensen	39°48	x	124°54
Sŏngch'ŏn	Seisen	39°16	x	126°12
Songhwa	Shōka	38°22	x	128°08
Sŏngjin	Jōshin	40°40	x	129°12
Sŏnsan	Zensan	36°14	x	128°18
Sorok-Do	Sorokutō	34°30	x	127°09
Sŏsan	Zuisan	36°46	x	126°26
Suan	Suian	38°42	x	126°22
Sunch'ang	Junshō	35°22	x	127°08
Suwŏn	Suigen	37°16	x	127°01
Taedong	Daido	38°58	x	125°40
Taedong-Gang (River)	Daidōko			
Taegu	Taikyu	35°52	x	128°36
Taejŏn	Taiden	36°20	x	127°26

Korean Romanization	Japanese Romanization	Latitude (N.)	x	Longitude (E.)
Talsŏng	Tatsujō	35'40	x	128'30
Tanch'ŏn	Tansen	40'28	x	128'54
Tangjin	Tōshin	36'54	x	126'38
Tanyang	Tanyō	36'56	x	128'20
Tŏkch'on	Tokusen	39'46	x	126'18
Tongnae	Tōrai	35'12	x	129'05
Tongyŏng	Tōei	34'50	x	128'26
Tuman-Gang (Tumen River)	Tomanko			
Uiju	Gishū	40'12	x	124'32
Ŭiryŏng	Ginei	35'19	x	128'16
Ŭisŏng	Gijō	36'22	x	128'42
Ulchin	Ucchin	37'00	x	129'30
Ullung-Do (Dagelet)	Utsuryō-tō	37'30	x	130'52
Ullyul	Inritsu	38'30	x	125'12
Ulsan	Urusan	35'34	x	129'20
Unggi	Yuki	42'20	x	130'20
Unp'yŏngmyŏn	Onheimen	37'34	x	127'00
Unsan	Unzan	39'58	x	125'48
Wiwŏn	Igen	40'54	x	126'04
Wŏnju	Genshū	37'20	x	127'56
Wŏnsan	Genzan	39'10	x	127'26
Yangdŏk	Yōtoku	39'10	x	126'54
Yanggu	Yōkō	38'06	x	128'00
Yangju	Yōshū	37'45	x	127'06
Yangsan	Ryōsan	35'20	x	129'02
Yŏju	Reishū	37'18	x	127'38
Yŏnan	Enan	37'54	x	126'10
Yŏngam	Reigan	34'48	xx	126'42
Yongamp'o	Ryūgampo	39'56	x	124'22

Korean Romanization	Japanese Romanization	Latitude (N.)	x	Longitude (E.)
Yŏngch'ŏn	Eisen	35°58	x	128°56
Yŏngdong	Eidō	36°10	x	127°46
Yŏngdŭngp'o	Eitōhō	37°31	x	126°54
Yŏnggwang	Reiko	35°16	x	126°30
Yŏng'il	Geijitsu	36°02	x	129°26
Yongin	Ryūjin	37°18	x	127°07
Yŏngju	Eishū	36°50	x	128°38
Yongsan	Ryusan	37°30	x	126°50
Yŏngwŏl	Neietsu	37°10	x	128°28
Yŏngwŏn	Neien	39°50	x	126°32
Yŏngyang	Eiyō	36°40	x	129°06
Yŏnsan	Renzan	36°12	x	127°14
Yŏsu	Reisui	34°44	x	127°44

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